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Content

Advancing Indian Farms with Digital Solutions

This editorial is based on "Farm to fork goes digital: Indian agri on the cusp of a tech revolution" which was published in Business Standard on 27/10/2024. The article discusses that the Digital Agriculture Mission, with a Rs 2,817 crore budget, aims to enhance farmers' welfare and productivity through improved digital infrastructure. Growing mobile and internet use in rural areas is boosting technology adoption and decision-making in farming.

Tag: GS Paper - 2, Government Policies & Interventions, GS Paper 3, E-Technology in the Aid of Farmers, Agricultural Marketing, Technology Missions

The Indian agricultural sector is on the verge of the opportunity of a **digital transformation**, with the government recently approving an outlay of **Rs 2,817 crore** for the Digital Agriculture Mission. This initiative is designed to establish extensive **public digital infrastructure**, empowering farmers with ICT-based tools for expert advice, real-time solutions, and improved farming skills. Digital tools are expected to streamline **land records, financial transactions, and procurement**, reducing disputes, malpractices, and boosting policy efficiency.

Other government initiatives, from the Kisan Suvidha app to **satellite-based crop monitoring** and drone technology, have paved the way for digitisation of agriculture.

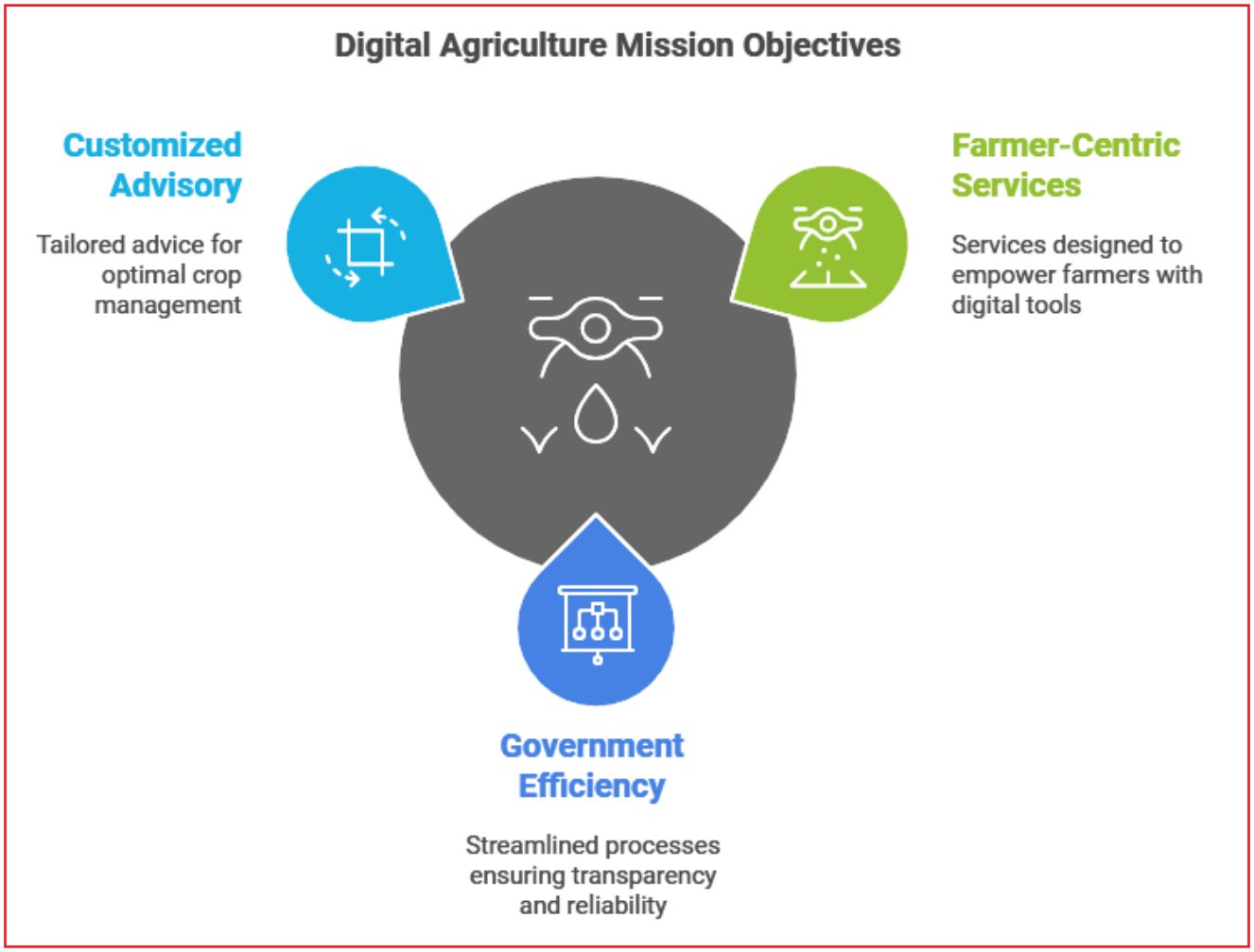
What is Digital Agriculture?

- **Digital Agriculture**: Integrates **Information and Communication Technologies (ICT)** and **data ecosystems** to enhance farming practices.
  - The goal is to provide timely, targeted information and services, ensuring farming is **profitable**, **sustainable**, and capable of delivering **safe**, **nutritious**, and **affordable food** for all.
  - The Committee on Doubling Farmers' Income (DFI) recommended increasing digital agriculture initiatives, focusing on technologies such as **Remote Sensing, GIS (Geographic Information System), Data Analytics, Artificial Intelligence(AI), Internet Of Things (IoT), Robotics, Drones, and Blockchain**.

Why does Indian Agriculture need to be Digitised?

- **Increasing Productivity**: Precision Agriculture (PA) allows precise application of fertilizers, water, and pesticides, maximizing crop yields while conserving resources.
  - **Weather monitoring systems** and **satellite data** help farmers make informed decisions that improve productivity and efficiency.
  - **IoT-based sensor networks** improve real-time monitoring of environmental conditions, aiding in the early detection of stresses affecting crops.
- **Cost Reduction**: Digital solutions reduce reliance on traditional practices, lowering input costs through better resource management.
  - ICT-based tools like **soil sensors** and **digital advisory platforms** minimize unnecessary expenses on agrochemicals.
- **Enhanced Soil and Water Conservation**: Soil mapping and **remote sensing technologies** enable monitoring of soil health and water availability, crucial for sustainable agriculture.
  - Digitisation supports **water-efficient practices**, essential in water-scarce regions.
- **Socio-Economic Upliftment**: Increased income and **market access** improve the socio-economic status of farmers. Mobile applications and digital market platforms link rural producers directly to buyers.
  - For example, the National Agriculture Market (eNAM) platform links more than **1,000 mandis** across India, offering price information and market trends to over **1.7 crore farmers** as of 2023.
  - Knowledge dissemination enables rural communities to adopt best practices, enhancing both **yield quality** and **economic security**.
- **Financial Inclusion**: Digital technologies enhance farmers' access to credit, insurance, and other financial services.
  - For example, under the PM-KISAN scheme, the Government of India has disbursed over **Rs. 3.24 lakh crore** to more than **11 crore farmers** through Direct Benefit Transfer (DBT).
- **Improving Traceability and Quality Standards**: **Blockchain technology** and **AgriStack** ensure traceability across the agricultural supply chain, reducing post-harvest losses and enhancing food safety standards.
  - Better data enables **farmer-centric policies**, fostering transparency and accountability in agricultural practices.
- **Data Collection**: Advanced tools have revolutionized data collection, categorized into **scientific**, **geo-referenced**, **genomic**, and **socio-economic data**.
  - Technologies like **drones** and **satellite imagery** are utilized for real-time data collection, essential for precise agricultural practices.

- **Modeling and Data Analytics**: Integrated modeling and data analytics are critical for optimizing agricultural processes. Tools like **crop models** (e.g., DSSAT-CSM) predict crop growth and yields.
  - **Machine learning techniques**, particularly deep learning models, enhance yield estimation and incorporate various data sources.
- **Delivery and Control**: Digital technologies facilitate efficient farm management, including **pest identification**, **irrigation monitoring**, and **yield forecasting**.
  - These advancements improve farm practices, reduce pollution, and provide farmers with access to **market intelligence** and **financial services**.



What is the Digital Agriculture Mission?

- **Digital Agriculture Mission**: The Digital Agriculture Mission was launched in **September 2024** with an outlay of **Rs. 2817 Crore** to establish **Digital Public Infrastructure (DPI)** for agriculture, as announced in the **2023-24** and **2024-25** budgets.
- **State Collaboration**: The Government of India has signed **MoUs with 19 States** to facilitate the development of these DPIs.
- **Agri Stack**: Farmers will receive a **digital identity** (Farmer ID) similar to **Aadhaar,** with data on crops collected through **mobile-based surveys**.
  - The goal is to create digital identities for **11 crore farmers** by **2026-27**, with a nationwide crop survey set to launch within two years.
- **Krishi Decision Support System**: Launched in **August 2024**, this system will unify remote sensing data on crops, soil, and weather, aiming to create **Soil Profile Maps** for **142 million hectares** of agricultural land.
- **Digital General Crop Estimation Survey (DGCES)**: This initiative will provide yield estimates and roll out nationwide from **2024-25**.

- **Krishi Sakhis**: A **MoU** signed in **2023** promotes the **Krishi Sakhis** initiative, training women in agricultural practices.
  - Krishi Sakhis are trained in agro-ecological techniques and receive refresher courses on **natural farming** and **soil health**.
  - They will be certified as **Para-extension Workers** after passing a proficiency test.
  - It is estimated that certified Krishi Sakhis can earn over **Rs 50,000 annually**, enhancing their role in supporting rural agriculture.

What are Other Government Initiatives to Promote Digital Agriculture?

- **National e-Governance Plan in Agriculture (NeGP-A)**: Launched in **2010-11**, this plan promotes **ICT in agriculture**, facilitating access to information and fostering **digital literacy** in **rural communities**.
  - Expanded nationwide, it includes **e-extensions** of support services to guide farmers through **digital transformation**.
  - Funds were allocated for site preparation, establishing **computer training labs**, hardware and software procurement, backup power arrangements, setting up **State Project Management Units (SPMUs)**, and ensuring connectivity for hardware installations.
- **Unified Farmer Service Platform (UFSP)**: UFSP acts as a **central agency**, consolidating infrastructure, data, applications, and tools that facilitate **interoperability** between public and private **agricultural IT systems**.
  - **UFSP** simplifies **registration processes** for service providers, ensuring faster **service delivery** for farmers.
- **Farmers Database**: The Farmers Database aims to create a **nationwide record** linked to land records, enhancing agricultural planning and policy-making. It provides unique farmer IDs (FIDs) to track benefits from various schemes.
  - This centralized database supports issuing **soil health cards, crop advisories, precision farming, and managing subsidies**.
- **BharatNet**: It is India's rural broadband initiative, aiming to connect over **250,000 Gram Panchayats** via high-speed **optical fiber networks**.
  - In agriculture, **BharatNet** enables **digital access** to weather forecasts, market prices, and modern farming techniques, empowering rural farmers to make **informed decisions**, boost productivity, and connect with **wider markets** for better income.
- **NAMO Drone Didi Scheme**: The **NAMO (New Agriculture Market Order) Drone Didi Scheme** offers specialized training in **drone technology**, empowering women with essential skills for modern agriculture.
  - This initiative fosters the development of a drone ecosystem, with the vision to enhance women's roles in the agricultural sector, thereby promoting the **digitization of agriculture**.
- **Other Supporting Initiatives**: **Kisan Suvidha App**, **Kisan Call Centres**, and **Agri Market App** enable farmers to access **market rates**, **weather forecasts**, and **technical advice**.
  - **Soil Health Card Portal** and the **Pradhan Mantri Fasal Bima Yojana (PMFBY)** leverage digital tools to provide **soil health insights** and **insurance coverage** for crop losses.

What are the Challenges of Digitisation in Indian Agriculture?

- **High Initial Capital Requirements**: Adoption of technologies like **drones**, **satellite imagery**, and **sensor-based systems** requires significant investment, which is difficult for **small farmers**.
  - Many farmers rely on **government subsidies** and **financial schemes**, which are often insufficient for large-scale adoption.
- **Small Land Holdings**: According to the **Situation Assessment Survey (SAS)** of Agricultural Households conducted by **NSO**, **89.4%** of agricultural households own **less than two hectares** of land, which complicates the implementation of **scalable digital solutions**.
  - Small farms cannot always justify the **cost of digitisation**, leading to low adoption rates in **rural regions**.
- **Digital Literacy Constraints**: **Rural illiteracy** and limited understanding of digital tools prevent many farmers from using **advanced ICT solutions** effectively.
  - The disparity in tele-density, with **Urban Tele-density** at **133.72%** and **Rural Tele-density** at **59.19%** as of March 2024, presents a significant challenge for the **digitization of agriculture** in India, limiting rural farmers' access to essential **digital tools**.
  - Lack of **training programs** hinders the adoption of even basic digital tools like **soil sensors** and **yield monitoring apps**.
- **Inadequate Rural Infrastructure**: Inconsistent **internet connectivity** and **power supply** issues in rural areas slow the adoption of **digital tools**.
  - Infrastructure like **broadband access** and **mobile towers** remains limited in **remote regions**, creating a digital divide.

- **Limited Access to Credit and Financing**: Many small farmers lack access to **formal credit** due to poor **creditworthiness** or absence of **collateral**, making it difficult to invest in digitisation.
  - The **formal banking sector** needs to develop farmer-friendly **financial products** to support technology adoption.
- **Data Trust and Security:** Ensuring **data trust**, **privacy**, **security**, **validation**, and **storage** remains a significant hurdle in digital agriculture.
  - Collaborative efforts between **researchers** and **IT experts** are essential to enhance **agricultural data management**, leveraging **IoT technology** for effective solutions.
- **Complexity in Data Capture:** The diverse range of **crops**, **climate zones**, and **soil conditions** presents a challenge in integrating these variables under a unified **digital framework**.
  - This complexity can hinder the widespread **adoption** of digital agriculture solutions.

What Should be Way Ahead for Digitisation of Agriculture in India?

- **Strengthening Digital Infrastructure**: **Broadband internet access**, **mobile towers**, and **digital literacy programs** are essential to expand digital reach in **rural areas**.
  - Investment in **satellite imaging**, **soil health information systems**, and **land mapping** will improve data accuracy, empowering **data-driven decisions**.
- **Encouraging Public-Private Partnerships**: Collaborations with **tech startups**, **Farmers Producer Organisations (FPO)**, and **private agri-tech firms** can foster faster adoption of **digital tools**.
  - **FPOs** can facilitate group purchases of **digital resources** for **small farmers**, reducing costs and increasing adoption rates.
- **Improving Financial Accessibility**: Banks should provide **low-interest loans**, **subsidies**, and **microfinancing** specifically for **digital agriculture investments**.
  - Introducing **flexible credit options** and incentives for adopting digital tools will improve **financial viability** for farmers.
- **Enhancing Farmer Capacity and Digital Literacy**: **Government-led training programs** and **awareness campaigns** can bridge the digital literacy gap, ensuring rural communities can leverage **digital tools** effectively.
  - **Extension workers** should be trained to assist farmers in using ICT solutions, ensuring **hands-on guidance**.
- **Data Security and Privacy Measures**: With increased reliance on **data** through initiatives like **AgriStack**, robust data protection policies are essential to safeguard **farmers' personal information**.
  - **Clear guidelines** on data usage, transparency, and **farmer consent** should be established to protect data integrity.

Conclusion

Digital agriculture is revolutionizing Indian farming, enhancing **efficiency, productivity, and sustainability**. Initiatives like the **Digital Agriculture Mission**, **Agri-Stack**, and **Krishi Decision Support Systems** empower farmers with **real-time data**, **expert advice**, and **direct benefits**. Rising internet use in rural areas fosters a tech-driven culture, improving productivity, reducing costs, and enabling **informed decisions**. **Public-private partnerships**, **policy support**, and **training** are vital, positioning Indian agriculture for **self-reliance** and **global competitiveness**.

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India's Path to Climate Resilience

This editorial is based on "Why climate adaptation can't wait any longer" which was published in Hindustan Times on 01/11/2024. The article brings into picture the urgent need for climate adaptation alongside mitigation, highlighting India's potential to lead with innovative, dual-purpose initiatives like PM Surya Ghar Yojana as a model for the Global South.

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

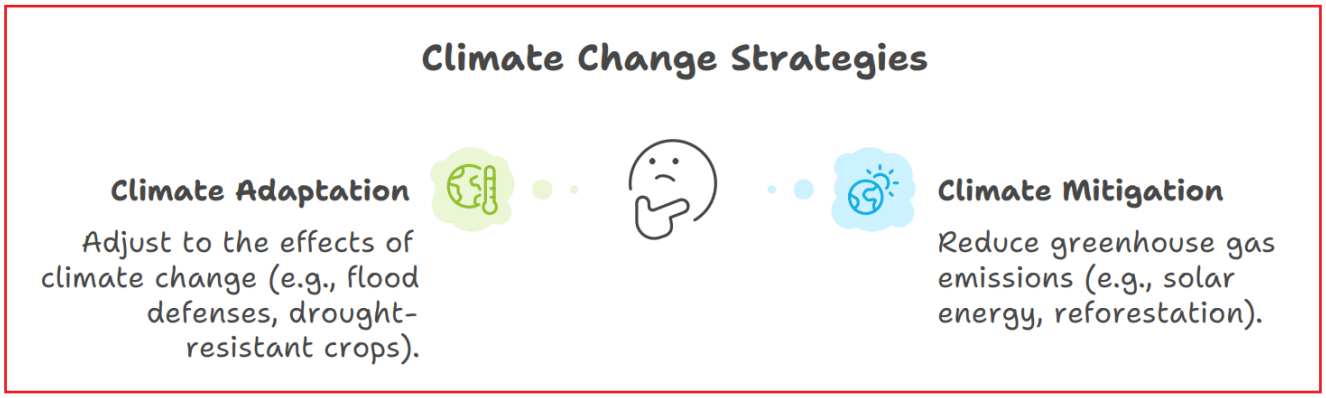
With **global temperatures rising** and extreme weather intensifying, **climate adaptation is now as critical as mitigation.** The UN warns that the **1.5°C limit may be breached within 15 years,** putting countries like India at risk. With inadequate international climate finance, India can lead by developing solutions that blend adaptation with mitigation. As **COP in Baku nears,** India's initiatives like **PM Surya Ghar Yojana** could serve as a model for the Global South.

What is Climate Adaptation and Climate Mitigation?

- **Climate Adaptation:** Climate adaptation refers to the process of **adjusting to the actual or expected climate and its effects**. It involves making changes to social, economic, and environmental practices to minimize the damage caused by climate change.

- Examples of climate adaptation include **building flood defenses, developing drought-resistant crops, improving water management systems**, and implementing early warning systems for natural disasters.

- **Climate Mitigation:** Climate mitigation involves efforts to reduce or prevent the emission of **greenhouse gases.** Its goal is to address the root causes of climate change by limiting the extent of global warming.
  - Examples of climate mitigation strategies include adopting **solar and wind energy, promoting energy-efficient appliances, reforestation,** and reducing reliance on fossil fuels.



Why is Climate Adaptation Just as Crucial as Climate Mitigation?

- **Inevitability of Near-term Impacts:** The Earth has already warmed by **1.1°C,** and even **immediate emission cuts** can not prevent certain climate impacts from unfolding in the coming decades.
  - Vulnerable communities urgently need adaptation strategies to survive these severe changes.
  - In 2023, record high temperatures raised poverty risks for **32 to 132 million people** by 2030, with **climate-related losses** totaling **USD 260 billion in 2022**.
- **Economic Cost of Inaction:** Delaying adaptation leads to **escalating costs in disaster response, infrastructure, and economic stability**, especially for developing nations.
  - Conversely, a global investment of **USD 1.8 trillion** in **climate adaptation** measures such as early warning systems, climate-resilient infrastructure, improved agriculture, coastal mangrove protection, and resilient water resources **could generate USD 7.1 trillion in returns** through avoided costs and various social and environmental benefits.
- **Food and Water Security Crisis:** Climate change is disrupting agricultural patterns, water availability, and food production, **making adaptation in these areas critical for global food security.**
  - A recent study using IPCC's highest warming scenario projects a **17% global decline in yields for major crops**—coarse grains, oil seeds, wheat, and rice, which will cover about **70% of the global harvested area** by 2050 compared to a stable climate scenario.
- **Urban Vulnerability:** With over half the world's population residing in cities, urban areas face unique climate risks such as urban flooding, heatwaves, necessitating **immediate adaptation for infrastructure, housing, and public services.**
  - Majority of urban expansion in developing countries is in hazard-prone areas, with adaptation costs projected at **USD 295 billion annually by 2050**
- **Ecosystem and Biodiversity Preservation:** Mitigation alone cannot protect ecosystems already stressed by climate change; adaptation strategies are essential to preserve biodiversity and maintain ecosystem services.
  - **IPBES Global Assessment** estimated that 1 million animal and plant species are threatened with extinction and the **World Economic Forum** highlights that **$44 trillion** in economic value depends on nature's services.
- **Health System Resilience**: Climate change introduces new health challenges and worsens existing one**s, requiring adaptation of health systems and infrastructure.**
  - The **WHO** projects **250,000 additional yearly deaths** by the 2030s due to climate change impacts on diseases like malaria and coastal flooding.
  - Also, **Climate impacts disproportionately harm vulnerable populations,** making adaptation essential for social equity.

- **World Migration Report 2024** states that climate impacts will **force 216 million people** to move within their countries by 2050.

How India is Progressing Towards Climate Adaptation?

- **Policy Framework and Planning:** India has established comprehensive adaptation strategies through its **National Action Plan on Climate Change (NAPCC)** demonstrating a structured approach to climate resilience.
  - The framework includes eight national missions and has been reinforced by the **Long-Term Low Carbon Development Strategy (LT-LEDS)** submitted at COP27.
  - **30 adaptation projects** have been approved at a total cost of INR 8,470 million (Third Biennial Update Report to The United Nations Framework Convention on Climate Change)
  - The government allocated **₹3,030 crore** for climate action in **Budget 2024-25.**
- **Agricultural Adaptation:** India is advancing climate-smart agriculture through the **National Innovations in Climate Resilient Agriculture (NICRA)** and **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY),** emphasizing drought-resistant crops and efficient irrigation.
  - More than **200 varieties tolerant to various stresses** have been demonstrated in **446 Climate Resilient Villages (CRVs)** at 151 vulnerable districts/clusters (as of 2021-22).
  - The PM-KISAN scheme supports **11.3 crore farmers** with a focus on climate adaptation practices. (as of April-July 2022-23 cycle)
- **Water Resource Management:** The Jal Shakti Ministry's initiatives, notably the **Jal Jeevan Mission** and **Atal Bhujal Yojana,** are transforming water resource management and adaptation strategies, emphasizing conservation and groundwater recharge.
  - As of **October, 2024**, Jal Jeevan Mission has successfully provided tap water connections to **11.95 crore additional rural households**, bringing the total coverage to more than 15.19 crore households
- **Urban Resilience:** India's urban adaptation is facilitated through missions like **Smart Cities Mission** and **AMRUT 2.0,** integrating climate resilience into urban planning.
  - As of **July 2024,** the 100 Cities have completed 7,188 projects (**90% of total projects**) as a part of Smart Cities Mission.
- **Coastal Adaptation:** The **National Coastal Mission Scheme** and state initiatives enhance coastal resilience through mangrove restoration, sea wall construction, and early warning systems.
  - India has **increased its mangrove cover by 364 sq km** over the past decade (**Economic Survey 2022–2023)**, with the **Indian National Centre for Ocean Information Services (INCOIS)** providing early warnings to many coastal villages.
- **Renewable Energy and Adaptation:** India's **renewable energy program**, especially **PM-KUSUM and PM Surya Ghar Yojana**, combines mitigation with adaptation benefits for vulnerable communities.
  - As of **October 2024,** renewable energy-based electricity generation capacity stands at **201.45 GW,** accounting for 46.3 percent of the country's total installed capacity. This marks a major shift in India's energy landscape, reflecting the country's growing reliance on cleaner, non-fossil fuel-based energy sources.
- **Health Sector Adaptation:** The **National Action Plan for Climate Change and Human Health** is bolstering health infrastructure to address climate-related impacts.
  - As of 2023, India has established **1.6 lakh Health and Wellness Centers** under Ayushman Bharat. Further, incorporation of principles of **Green & Climate Resilient Hospitals** has been made under Indian Public Health Standards (IPHS), 2022.
- **Financial Mechanisms:** India is innovating financial mechanisms for adaptation via **green bonds, climate budgeting, and international collaborations**.
  - In FY 2022-23, the Government raised `16,000 crore through **Sovereign Green Bonds (SGrB).**
  - The **National Bank for Agriculture and Rural Development (NABARD)** is the National Implementing Entity (NIE) for **National Adaptation Fund for Climate Change (NAFCC)** and project funds are released to NABARD in installments based on the performance of the projects and NAFCC guidelines

What are the Major Challenges for India in Climate Adaptation?

- **Financial Constraints:** India faces a significant gap between adaptation needs and available financial resources, with **limited domestic fiscal capacity** and inadequate international support hampering the implementation of crucial adaptation projects.
  - The challenge is compounded by **competing developmental priorities** and the high upfront costs of adaptation infrastructure.

- India will need to spend an estimated **85.6 trillion rupees ($1.05 trillion)** by **2030** to adapt its various industries to be compliant with climate change norms.

- **Data and Monitoring Challenges:** India struggles with inadequate climate data infrastructure, **limited local-level vulnerability assessments, and weak monitoring systems for adaptation projects,** affecting evidence-based planning and implementation.
  - More than **80% of India's population** lives in districts highly vulnerable to extreme hydro-met disasters. Also, **only 0.86% of districts** in India have a high adaptive capacity. (**Council on Energy, Environment and Water**)
- **Urbanization and Infrastructure Pressure:** Rapid urbanization is straining existing infrastructure and creating new vulnerabilities, while adaptation needs in cities grow exponentially.
  - India's urban population is expected to reach 600 million by 2036. According to NIUA, **70% of urban infrastructure needed by 2030 is yet to be built**, requiring climate-resilient planning.
- **Agricultural Vulnerability:** Small and marginal farmers, comprising **86% of Indian farmers**, face severe challenges in adopting climate-resilient practices due to limited resources and knowledge access.
  - Climate variability could reduce agricultural productivity by **10-40% by 2100.**
- **Water Stress Management**: Managing water resources for adaptation is increasingly challenging due to irregular monsoons, groundwater depletion, and competing demands.
  - **NITI Aayog's Composite Water Management Index** reports 600 million Indians face high to extreme water stress.
  - India's northwestern region is predicted to experience **critically low groundwater availability by 2025**, according to a new report by the United Nations.
- **Coastal Vulnerability:** India's 7,500 km coastline faces increasing adaptation challenges from **sea-level rise, cyclones, and coastal erosion,** affecting millions of coastal residents.
  - **One-third of India's coastline** is vulnerable to erosion, impacting coastal communities.
- **Climate-Induced Migration:** Managing climate-induced migration and providing adaptation support to affected communities poses a growing challenge.
  - By 2050, India may experience significant migration, with projections suggesting that up to **45 million people could be displaced due to climate change.**

What Measures can India Adopt to Accelerate Climate Adaptation?

- **Enhanced Financial Mechanisms:** To enhance financial support for climate adaptation, it is essential to revamp the **National Climate Adaptation Fund**, to be financed through a combination of **carbon taxes, cess, and contributions from Environmental, Social, and Governance (ESG) initiatives.**
  - This fund will provide targeted resources for adaptation projects. In addition, **state-level green bonds** specifically designed for adaptation initiatives will allow state governments to raise necessary funds.
  - **Blended finance mechanisms** should also be created, combining public funds with private investment to increase overall financial capacity.
  - Furthermore, **innovative financial products** targeting climate adaptation projects will attract investments, and **special purpose vehicles (SPVs)** at the state level will ensure efficient management and allocation of adaptation funds.
- **Localized Adaptation Planning: Localized adaptation planning** is crucial for effectively addressing climate impacts at the community level.
  - Each district should establish **climate adaptation cells** staffed with technical experts to assess local vulnerabilities and develop tailored solutions.
  - By **integrating traditional knowledge with scientific data**, these cells can create effective, location-specific adaptation strategies.
- **Technology-Driven Monitoring:** Implementing a technology-driven approach to climate monitoring can significantly **enhance preparedness and response capabilities.**
  - A national digital platform should be developed to **integrate real-time climate data,** providing accessible information for decision-makers and communities alike.
  - The **deployment of Internet of Things (IoT) sensors and satellite monitoring** systems will enable early warning for climate-related events.
  - Creating mobile applications for community-level monitoring will further empower citizens to participate in data collection and reporting.
- **Agriculture and Water Resilience:** Building resilience in agriculture and water management is essential for adapting to climate change.

- Scaling up **climate-smart agriculture through incentive mechanisms** will encourage the adoption of sustainable practices that enhance productivity while minimizing environmental impacts.
- The promotion of **drought-resistant crop varieties will help farmers mitigate the effects of water scarcity,** while the development of efficient irrigation systems will optimize water use for agricultural purposes.

➢ **Urban Climate Resilience:** To ensure urban areas are prepared for climate impacts, it is vital to implement **climate-resilient building codes** that mandate standards for new constructions.

- Urban planning should incorporate **sponge city concepts that enhance water management capabilities,** reducing the risk of flooding.
- Initiatives to create **urban forests and heat action plans will help mitigate urban heat effects,** while sustainable transport systems will reduce emissions and improve air quality.

➢ **Coastal Adaptation:** Coastal areas require integrated management strategies to effectively respond to climate change challenges.

- Implementing **integrated coastal zone management** will ensure a balanced approach to development and conservation.
- Developing **climate-resilient port infrastructure** will safeguard these critical economic assets against climate impacts.
- Furthermore, **restoring and protecting mangrove ecosystems will provide natural barriers against erosion and flooding**, while strengthening coastal early warning systems will enhance community preparedness for extreme weather events.

➢ **Skill Development:** Investing in skill development is essential for enhancing climate adaptation capacities across various sectors.

- Dedicated **climate adaptation skill programs** will be created to train individuals in effective adaptation practices.
- Establishing **climate education centers** will further enhance public awareness and understanding of climate issues, promoting a culture of adaptation.

➢ **Private Sector Engagement:** Engaging the private sector is crucial for scaling up investments in climate adaptation initiatives.

- Developing **tax incentives for adaptation investments** will encourage businesses to contribute to resilience-building projects.
- **Mandating climate risk disclosure** will promote transparency and encourage corporations to consider climate impacts in their operations.
  - Supporting climate-resilient business models will further incentivize private sector involvement in adaptation efforts.

➢ **Research and Innovation:** Fostering research and innovation is vital for developing effective climate adaptation solutions.

- Establishing **climate adaptation innovation hubs** will serve as centers for research and development of new strategies and technologies.
- Creating research consortiums will facilitate **collaboration among academic institutions, government, and industry** to advance adaptation research.

➢ **Inter-State Coordination** Effective climate adaptation requires coordinated efforts across states.

- Creating **Regional Climate Adaptation Councils** will facilitate collaboration and communication between states on shared challenges and solutions.
- Developing **cross-state adaptation projects** will allow for the pooling of resources and expertise to address regional climate impacts.
- Coordinating **shared resource management will ensure sustainable use of environmental assets,** while harmonizing adaptation policies across states will enhance the overall effectiveness of resilience efforts.

➢ **Mainstreaming Adaptation:** Mainstreaming **climate adaptation into development planning** is essential for long-term resilience.

- Integrating adaptation considerations into all levels of development planning will ensure that **climate impacts are addressed proactively.**
- Existing infrastructure should be assessed and upgraded to climate-proof it against future risks.
- Finally, **developing adaptation indicators** will allow for ongoing monitoring and evaluation of adaptation initiatives, ensuring accountability and continuous improvement.

Conclusion:

India's proactive climate adaptation efforts are commendable, but significant challenges remain. To accelerate progress, India must enhance **financial mechanisms, strengthen localized adaptation planning, leverage technology, and prioritize agriculture, water, urban, and coastal resilience.** By effectively addressing these challenges and implementing comprehensive adaptation strategies, **India can build a resilient future and lead by example for the Global South.**

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Reforming India's Financial Watchdogs

This editorial is based on "Needed: A road map to regulate the regulators" which was published in Hindustan Times on 04/11/2024. The article highlights the growing scrutiny of India's financial regulators, emphasizing the urgent need for a balance between regulatory autonomy and accountability. Strengthening oversight mechanisms is now essential.

Tag: GS Paper - 2, Statutory Bodies, GS Paper - 3, Banking Sector & NBFCs, Government Policies & Interventions

India's financial regulators are facing unprecedented scrutiny, with Securities and Exchange Board of India(SEBI) **under spotlight for its handling of the Adani case** and Reserve Bank of India (RBI) **drawing criticism for its approach to fintech firms versus traditional banks**. As stakes rise in India's financial markets, the delicate balance between **regulatory autonomy and accountability** becomes increasingly crucial. History shows that effective regulation requires both **independence and oversight.** The time has come for India to strengthen its regulatory accountability mechanism,

What are the Key Financial Regulatory Bodies in India?

- **Reserve Bank of India (RBI):** Primary banking and monetary authority established in 1934, serving as India's central bank with extensive regulatory powers.
  - The RBI majorly regulates **all scheduled commercial banks, NBFCs and foreign exchange markets.**
- **Securities and Exchange Board of India (SEBI):** Established in 1992 to regulate securities markets and protect investor interests.
  - Oversees **stock exchanges, mutual funds, and other market intermediaries**.
    - SEBI regulates two major stock exchanges (NSE and BSE).
- Insurance Regulatory and Development Authority of India **(IRDAI):** Created in 1999 to regulate and develop the insurance sector.
  - Supervises life insurance companies, general insurance companies, and specialized insurers.
  - India's insurance premium volume stands at **USD 131 billion as of 2022 (Life – 77%, Non-Life – 23%).**
- Pension Fund Regulatory and Development Authority (PFRDA)**:** Established in 2003 to regulate pension products and promote old-age income security.
  - Manages the National Pension System **(NPS)** with **over 6.62 crore subscribers.**

What is the Role of RBI and SEBI in Ensuring Regulatory Oversight and Market Stability in India?

- **Preventing Systemic Risk:** The cornerstone of India's financial regulatory framework rests on the twin pillars of RBI and SEBI's coordinated efforts to **maintain market stability and prevent systemic risks.**
  - Through sophisticated surveillance systems, both regulators continuously monitor their respective domains - **RBI focusing on banking sector health through stress tests and capital adequacy norms,** while SEBI oversees market integrity through **circuit breakers and real-time monitoring**.
  - This was notably demonstrated in **SEBI's recent directive related to F&O** that requires option buyers to pay the premium upfront, rather than at the end of the trading day.
    - This change lowers default risks and strengthens market integrity by ensuring full payment commitment when orders are placed.
  - Also, RBI's tightened approach has maintained banking sector stability with Gross non-performing assets (GNPAs) for banks are forecasted to drop to a **decade-low of 2.5% in FY25**, while ensuring orderly markets despite global volatilities.
- **Consumer Protection and Transparency:** Consumer protection stands as a central mandate for both regulators, implemented through **comprehensive frameworks** that safeguard retail investors and banking customers.
  - For instance, **SEBI has prohibited online bond platforms from offering unlisted debt securities** and unregulated products via subsidiaries, under rule 51A.
    - This aims to **safeguard investors** by limiting exposure to unlisted and potentially high-risk products.
  - Also, **RBI** introduced comprehensive guidelines in **September 2022** to regulate the rapidly growing digital lending **landscape**
  - Also, the regulators' consumer-centric approach was particularly visible in high-profile cases - **RBI's decisive action against Paytm Payments Bank for compliance violations** and **SEBI's mutual fund Categorization and Rationalization to enhance investor clarity.**
- **Technology Adoption and Innovation**: The modernization of India's financial sector has been

driven by both regulators' progressive approach toward technology adoption while maintaining security standards.

- RBI's successful **Central bank digital currency** pilot reaching **1 million daily transactions** complements **SEBI's push for T+0 settlement cycle**, putting India ahead of many developed markets.

➢ **Corporate Governance and Compliance:** Both regulators have established stringent oversight mechanisms that create a comprehensive governance framework for regulated entities.

- **SEBI's LODR (Listing Obligations and Disclosure Requirements) requirements** work in tandem with **RBI's Prompt Corrective Action (PCA)** framework which is a key tool to monitor the financial health of banks
- The implementation of enhanced **ESG reporting requirements across major listed entities** has positioned India at the forefront of sustainable finance.

What are the Current Accountability Concerns Raised at India's Financial Regulators?

➢ **Transparency in Decision-making:** The lack of public disclosure **regarding regulatory consultations and decision-making processes** raises significant accountability concerns.

- For instance, **RBI has repeatedly warned against cryptocurrency investments,** calling them a threat to financial stability, yet there has been **limited transparency on its long-term regulatory approach.**
- SEBI has also faced criticism for insufficient stakeholder engagement particularly evident in the **recent Adani-Hinderburg investigation.**

➢ **Conflict of Interest Management:** The current framework for managing conflicts of interest within regulatory bodies shows concerning gaps.

- **SEBI chairperson's recent conflict of interest allegations** highlight systemic weaknesses.
- The **absence of a cooling-off period for senior regulatory officials** entering private sector roles creates potential compromises.

➢ **Parliamentary Oversight Deficits:** The limited parliamentary supervision of regulatory bodies has created an accountability vacuum.

- Despite the **Second Administrative Reforms Commission's 2009 recommendations**, regular parliamentary committee reviews remain inconsistent and inadequate.
- The **Public Accounts Committee** has recently decided to review the performance of regulatory bodies established by Parliamentary Acts.
  - However, significant gaps remain in continuous oversight and accountability.

➢ **Staff Accountability and Internal Governance:** Internal accountability mechanisms within regulatory bodies show significant weaknesses**, particularly in staff performance evaluation and decision-making processes.**

- **September 2024's staff protests at SEBI HQ** and **October 2024's alleged dissent within RBI's Monetary Policy Committee** highlight governance challenges.

➢ **Delay in Enforcement Actions**: The significant time lag between violation detection and enforcement action compromises regulatory effectiveness.

- The RBI's delayed introduction of specific regulations for **digital lending platforms** created a regulatory vacuum that led to exploitative practices by unregulated loan apps
- Also, SEBI has been criticized for its delay in implementing **strict regulations around algorithmic trading,** which has led to several market volatility.

➢ **Political Interference**: In some instances, regulatory bodies may face pressure from the government to make decisions that align with political objectives rather than sound regulatory principles.

- Political interference can undermine the independence of regulatory bodies and their ability to make impartial decisions.
- **RBI** has, in recent years, been under pressure to increase its dividend payouts to the government, especially to meet budgetary targets and manage fiscal deficits.
  - The Reserve Bank of India has announced a **record dividend of ₹2.11 lakh crore to the Government of India** for the financial year 2023-24

How does the Rise of Fintech Impact Traditional Regulatory Approaches in India?

➢ **Data Localization and Privacy Challenges:** India's data localization requirements have forced a complete restructuring of fintech operations, with the **RBI mandating that all financial data must be stored exclusively in India**.

- This policy has created significant operational challenges for international fintech players while boosting domestic data center infrastructure development.

- PhonePe alone has invested **over Rs 2,800 crore to expand infrastructure,** including data centers, across India in a data localisation push, **highlighting the massive scale of regulatory impact on infrastructure requirements.**

- **Digital Payment System Integration:** The UPI ecosystem has necessitated new regulatory frameworks for **interoperability and settlement systems,** pushing traditional banking regulations to evolve beyond **institution-centric approaches.**
  - The **UPI system** now **handles over 10 billion transactions monthly,** requiring real-time oversight mechanisms previously unnecessary in traditional banking.
- **Alternative Credit Models:** The rise of **Buy-Now-Pay-Later (BNPL) and micro-lending platforms** has challenged traditional credit regulations, forcing the creation of new frameworks for **short-term, small-ticket lending.**
  - The Indian BNPL market is experiencing explosive growth, projected to reach **$100 billion by 2025.**

What Measures can India Adopt to Enhance the Accountability of Financial Regulators?

- **Enhanced Parliamentary Oversight Framework:** Establish quarterly mandatory appearances of regulatory heads before **dedicated parliamentary committees for performance review.**
  - Create specialized **sub-committees within existing parliamentary panels** focusing exclusively on financial regulation oversight.
  - Require **public disclosure of committee recommendations** and regulatory responses.
- **Standardized Public Consultation Process:** Mandate minimum public consultation period for all major regulatory changes, with structured feedback mechanisms.
  - **Create online portals for real-time tracking of consultation status** and stakeholder inputs.
  - Require regulators to publish **detailed rationale for accepting/rejecting stakeholder suggestions**.
  - **Similar systems in Singapore** achieved higher public participation in regulatory decisions.
- **Independent Regulatory Review Board:** Establish an autonomous board comprising financial experts, academia, and industry veterans to assess regulatory performance.
  - Implement quarterly performance audits based on **pre-defined metrics covering efficiency, transparency, and effectiveness.**
  - Require **regulatory impact assessments for all major decisions.**
- **Strengthened Internal Governance Structure:** Implement mandatory rotation of key positions within regulatory bodies every three years.
  - Create **internal ombudsman offices with direct reporting to parliamentary committees.**
  - Establish whistleblower protection mechanisms for regulatory staff. Require mandatory public disclosure of all senior-level appointments and their qualification criteria.
- **Technology-Enabled Transparency Platform:** Develop integrated digital platforms for **real-time disclosure of regulatory actions, decisions, and enforcement measures.**
  - Implement **blockchain-based recording of all regulatory decisions** for immutable audit trails.
  - Create public dashboards showing regulatory performance metrics updated monthly.
- **Professional Development and Accountability Framework:** Institute mandatory professional certification requirements for regulatory staff at all levels.
  - Create specialized training programs in emerging areas like **fintech, cyber security, and AI regulation.**
  - Establish clear performance metrics linked to **regulatory effectiveness.** Implement competitive compensation structures to attract top talent.
- **Coordinated Enforcement Mechanism:** Establish joint enforcement teams across regulators for overlapping jurisdictions.
  - Create a centralized database for enforcement actions accessible to all regulatory bodies.
  - Implement **standardized penalties and enforcement procedures across regulators.**

Conclusion:

India's financial regulators play a crucial role in **maintaining market stability and protecting investor interests**. However, to ensure their effectiveness, it is imperative to strengthen their accountability mechanisms. By enhancing transparency, conflict of interest management, parliamentary oversight, internal governance, and enforcement, **India can bolster the credibility of its financial regulatory framework.**

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Revolutionizing Higher Education in India

This editorial is based on "Rising STEM research demands revitalized education" which was published in

The Hindu on 06/11/2024. The article brings into picture the quality paradox in India's higher education system: despite increased access, graduate quality suffers due to an emphasis on research over teaching. Experts suggest refocusing on teaching quality and fostering research-teaching partnerships to address this gap.

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

India's higher education system is grappling with a significant challenge: **a mismatch between the skills of graduates and the demands of industry and research.** Despite the proliferation of new institutions, the quality of education, particularly in undergraduate programs, remains a concern. To address this issue, a more focused approach is needed including increased emphasis on pedagogical skills, and collaboration between research and teaching institutions.

Why is the Indian Higher Education System Underperforming Despite Recent Reforms?

- **Quality-Scale Tradeoff:** The rapid expansion of India's higher education system has **prioritized quantity over quality**, leading to diluted academic standards and inadequate infrastructure.
  - Most private institutions focus on **profit maximization rather than academic excellence,** resulting in subpar teaching and learning outcomes.
  - The regulatory framework has failed to ensure quality control during this expansion phase, creating a generation of unemployable graduates.
  - India has 1,043 universities and 42,343 colleges listed on the portal of the All India Survey on Higher Education but according to National Assessment and Accreditation Council (NAAC) approximately **30% of universities and colleges nationwide remain unaccredited, in violation of the National Education Policy (NEP) 2020.**
  - Also, quality trade off is quite visible in engineering grades with **only 45% meeting industry standards.**
- **Research Output and Innovation Gap:** Indian higher education institutions suffer from **a severe lack of research culture,** with minimal funding and infrastructure for meaningful research.
  - The pressure to **publish has led to quantity over quality**, with many papers appearing in predatory journals rather than respected publications.
    - The focus on teaching duties leaves faculty with little time for substantial research pursuits.
  - India's research spending stands at just **0.7% of GDP**, compared to **China's 2.4% and the US's 3.5%.**
  - In 2023, India had **467,918** patent filings**,** trailing behind China with **around 7.7 million filings** and the United States with **945,571**.
- **Faculty Crisis:** The Indian higher education system faces a critical shortage of qualified faculty members, with **many positions remaining vacant for years.**
  - The existing faculty often lacks proper training, research exposure, and industry experience necessary for modern education delivery.
  - The **bureaucratic hiring process and inadequate compensation packages** deter talented individuals from choosing academic careers.
  - Over **30% of teaching positions are lying vacant in 45 Central Universities** across India.
- **Industry-Academia Disconnect**: University curricula remain largely theoretical and outdated**, failing to meet contemporary industry requirements** and technological advancements.
  - **Most institutions operate in isolation from industry**, with minimal practical exposure or real-world problem-solving opportunities for students.
  - The lack of industry collaboration results in graduates who need extensive retraining before becoming productive in their jobs.
  - **Global Skills Gaps Measurement and Monitoring Report of ILO 2023** indicates that **47% of Indian workers**, especially 62% of females are underqualified for their jobs.
- **Funding Constraints:** Public funding for higher education remains inadequate, **forcing institutions to compromise on infrastructure, research facilities, and faculty quality.**
  - State universities particularly suffer from chronic underfunding, leading to **deteriorating infrastructure and academic standards.** The funding model relies heavily on **student fees**, making quality education increasingly unaffordable for many.
  - The allocation towards Higher Education in 2024-25 is estimated to **decrease by 17% from** than the **revised estimate for 2023-24**. Allocation towards the University Grants Commission (UGC) is estimated to **reduce by 61%.** (PRS)
- **Digital Divide in Higher Education:** While elite institutions have embraced digital transformation, the majority of universities struggle with **basic digital infrastructure and literacy.**

- The Covid-19 pandemic exposed and widened this digital gap, creating a two-tier education system.
- A study by the **Azim Premji Foundation in 2021** showed that almost **60% of school children in India** cannot access online learning opportunities.
  - This highlights a significant digital divide in the country, with a large proportion of students lacking access to the internet and digital infrastructure.

- **Mental Health and Student Support:** Universities largely ignore the growing mental health crisis among students, with inadequate counseling and support services.
  - **Academic pressure, career uncertainty, and social expectations** create significant psychological stress.
  - The lack of holistic development programs affects student well-being and academic performance.
  - A report by TimelyMD revealed that **50% of college students in 2023 identified mental health challenges** as their most significant source of stress
- **Entrepreneurship Ecosystem Weakness:** Despite emphasis on startup culture, universities fail to provide adequate entrepreneurship support and incubation facilities.
  - The **current academic environment doesn't nurture innovation and risk-taking abilities.** Limited industry connects restrict mentorship opportunities for student entrepreneurs.
  - The rate of **total early-stage entrepreneurship (TEA)** in India was merely **11.5% in 2022–23.**
- **Language Barriers:** Language barriers in India's higher education system create significant challenges for students, particularly those from rural or non-English-speaking backgrounds.
  - This disparity can lead to unequal access to quality education, limiting opportunities for academic success.
  - Recently, **Tribal students in Eklavya Model Residential Schools** in Andhra Pradesh were found struggling with language barriers as teachers instructed in Hindi instead of English or Telugu.

What are the Recent Indian Government Initiatives Related to Higher Education System?

- National Initiative for School Heads' and Teachers' Holistic Advancement (NISHTHA): This initiative extends training to school heads and teachers across various educational stages, including specialized training for Early Childhood Care and Education (ECCE). Over **32,648 Master Trainers** have been certified as part of this program.
- PARAKH (Performance Assessment, Review, and Analysis of Knowledge for Holistic Development): PARAKH, an autonomous body set up under NEP 2020, aims to standardize and enhance the assessment and evaluation process across all school boards in India. Activities under PARAKH include:
  - The **State Educational Achievement Survey (SEAS)**, which assesses students' learning competencies at different stages.
  - Developing **Competency-based Assessments** and **Holistic Progress Cards (HPCs)** to track students' overall development, including socio-emotional and cognitive aspects.
- National Education Policy 2020 **(NEP 2020)**: NEP 2020 has brought about significant changes to the curriculum and educational practices. Key milestones include:
  - The **National Curriculum Framework for Foundational Stage (NCF FS)** and the launch of learning material for **classes I and II** in 2023.
  - The **National Curriculum Framework for School Education (NCF-SE)** released in 2023, which aligns the school curriculum with the NEP, focusing on holistic and competency-based education.
  - **Budget 2024-25** announces **new scheme offering loans** up to ₹10 lakh for one lakh students to pursue higher education
- Institutions of Eminence (IoE) Scheme**:** Launched by the **Ministry of Education in 2018,** the IoE scheme aimed to identify 20 institutions and grant them complete autonomy to promote academic excellence and innovation.
- **Digital Initiatives**
  - SWAYAM **(Study Webs of Active-Learning for Young Aspiring Minds)**: A digital platform offering a range of online courses, from school to postgraduate levels, to support active learning.
  - **National Digital Library of India:** Provides easy access to a vast collection of educational resources, aiding students and educators across the country.

What Measures can India Adopt to Strengthen its Higher Education System?

- **Industry-Academia Integration Framework:** Create **mandatory industry sabbaticals for faculty members** every three years to maintain industry relevance.
  - Establish **industry-specific curriculum advisory boards** with rotating membership from leading companies.

- Develop **credit-based systems for students' industry projects and internships** as mandatory graduation requirements.
- Create **joint research and development centers within universities** funded by industry partners. Implement an **industry professional-in-residence program** where experts teach specialized courses.

- **Pedagogical Transformation Initiative:** Introduce **mandatory pedagogical training certification** for all faculty members through a standardized national program.
  - Establish **Centers of Teaching Excellence** in each state to train faculty in modern teaching methodologies, including **experiential and project-based learning**.
  - Mandate **regular teaching effectiveness assessments** through student feedback, peer reviews, and outcome analysis.
- **Quality Assurance Reformation**: Implement a **continuous assessment system replacing periodic accreditation** with real-time quality monitoring.
  - Create **specialized quality circles** within institutions with representation from all stakeholders.
  - Develop **outcome-based assessment frameworks** focusing on employability and skill development.
  - Implement AI-based analysis of institutional performance metrics for early intervention.
- **Student Support and Development:** Establish mandatory **career development cells with professional counselors and industry liaisons**.
  - Create **mental health support systems** with full-time counselors and wellness programs.
  - Develop soft skills and leadership development programs integrated into the curriculum. Create student innovation labs with funding support for entrepreneurial initiatives.
- **International Collaboration Framework:** Establish **joint degree programs** with reputed foreign universities with mutual credit recognition.
  - Create **international faculty exchange programs** with simplified visa and work permit processes.
  - Develop **global research partnerships with shared funding and resources**.
- **Regional Language Integration:** Develop **high-quality academic content in regional languages using AI-powered translation tools**.
  - Create **bilingual learning programs** with technical terminology banks in regional languages.
  - Establish **regional language research journals** with international indexing.
  - Implement translation support systems for academic resources and research papers.
- **Skill Development Integration:** Create modular skill certification programs aligned with **industry requirements.**
  - Establish **skill labs with industry-standard equipment** and training facilities.
  - Implement **credit transfer systems between vocational and academic programs.**
  - Develop continuous skill assessment and upgrade programs for students and faculty.

What can India Learn from Global Higher Education Models?

- **Finland's Trust-Based Model:** Finland's higher education system is known for its **high autonomy and trust-based approach**, eliminating standardized testing in favor of continuous assessment.
- **Singapore's Industry-Education Integration:** Singapore has created a model where the **government fosters strong collaboration between academia and industry**, benefiting both sectors.
  - From undergraduate level to Corp Labs at institutions, this integration has **improved graduate employment outcomes,** boosted workforce productivity, and supported economic growth.
- **Germany's Dual Education System:** Germany **combines theoretical learning with practical apprenticeships through its dual system**.
- **Israel's Entrepreneurial University Model:** Israeli universities **excel in turning academic research into commercial innovations.**
  - With strong ties to the **defense sector,** universities focus on interdisciplinary learning, entrepreneurship, and technology transfer offices.
- **Netherlands' Problem-Based Learning:** The Netherlands uses p**roblem-based learning**, where students tackle real-world challenges in small groups.
  - The country has a **"Binary System"** that distinguishes between research universities and applied sciences.
- **China's Rapid Transformation Model:** China's "**Double First Class**" initiative has rapidly transformed its higher education, focusing on research excellence and STEM education.
  - Universities benefit from **strong public-private partnerships** and international collaborations. China leads in **digital infrastructure and smart campuses.**

Conclusion:

India's higher education system needs a comprehensive overhaul to address its quality crisis. **Prioritizing teaching excellence, fostering industry-academia partnerships, and investing in research infrastructure** are crucial steps. By learning from global best practices and implementing innovative reforms, India can create a world-class higher education system that empowers its students and drives economic growth.

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Deepening the Indo-US Strategic Partnership

This editorial is based on "What Trump 2.0 means for India and South Asia" which was published in The Hindu on 07/11/2024. The article brings into picture the evolving India-U.S. relationship under the new U.S. leadership, highlighting opportunities in defense, technology, and energy, alongside challenges in trade and regional diplomacy.

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

India-US Relations are entering a new phase with the recent election of the **47th US President.** The bilateral relationship, which has been a cornerstone of India's foreign policy, encompasses strategic areas including **defense cooperation, technology transfers, and energy partnerships.** This transition in US leadership presents both opportunities and challenges for India's strategic interests, particularly in areas of **defense, trade, and regional diplomacy.**

What is the Significance of the United States for India?

- **Economic Partnership:** The **US has retained its position as India's top trading partner** in the **January-July 2024** period with bilateral goods trade surpassing $72 billion and Indian exports growing **9.3% to $48.2 billion.**
  - The economic interdependence spans sectors from IT services to pharmaceuticals, with significant potential for expansion in emerging technologies and manufacturing.
- **Strategic Defense Cooperation:** US-India defense partnership has evolved from a **buyer-seller relationship to co-development and co-production** of military hardware.
  - The cooperation extends to maritime security in the Indo-Pacific, counter-terrorism, and intelligence sharing.
  - QUAD partnership has strengthened bilateral defense ties.
  - U.S.-India defense trade has grown from **near zero in 2008** to over **20 billion USD in 2020**. Also, India has signed all four foundational defense agreements **(LEMOA, COMCASA, BECA, ISA**) with the **US.**
- **Technology & Innovation:** US remains critical for **India's technological advancement,** particularly in semiconductors, quantum computing, and AI.
  - The **U.S.-India Global Digital Development Partnership** seeks to unite U.S. and Indian private sector expertise and resources to promote responsible digital technology adoption across Asia and Africa.
    - Silicon Valley continues to be a major hub for Indian tech talent and startups.
- **Energy Security**: US has emerged as a significant energy partner for India, helping diversify its energy sources away from traditional suppliers.
  - According to the **World LNG report 2024** by **International Gas Union (IG),** released earlier this month, the US supplied India **1.8 MT LNG in the pre-pandemic period (2019**) and the quantity increased to 3.86 MT in 2021.
  - Cooperation in renewable energy technology is advancing India's clean energy goals.
    - The United States and India are collaborating to mobilize **$1 billion in new multilateral financing** through the International Bank for Reconstruction and Development **(IBRD)** to support projects, including the **expansion of India's domestic clean energy supply chain.**
- **Geopolitical Balance:** US partnership helps India maintain strategic autonomy and balance China's regional influence.
  - Collaboration in Indo-Pacific strategy through QUAD provides **diplomatic leverage.**
    - Exercise Malabar**,** which began in **1992** as a bilateral naval drill between the United States and Indian Navy, has evolved into a key multilateral event
  - QUAD initiatives committed **$50 billion for** Indo-Pacific infrastructure development over five years.
- **Healthcare & Pharmaceuticals:** Covid-19 pandemic highlighted the crucial healthcare partnership between nations.
  - India's pharmaceutical industry relies heavily on **US market access** while the **US benefits from affordable Indian generics.**

- Indian pharma companies supply **40% of US generic drug demand.**

❍ Initiatives like the **Indo-U.S. Health Dialogue** have yielded tangible results in disease surveillance, pandemic preparedness, and antimicrobial resistance.

➢ **Space Cooperation: NASA-ISRO** collaboration represents a growing dimension of bilateral ties. Joint satellite missions and space research enhance both countries' space capabilities.

❍ **Joint NASA-ISRO NISAR mission** worth $1.5 billion scheduled for 2024. **Space situational awareness** agreement enables sharing of satellite data.

❍ **NASA's Deep Space Network (DSN)** helped ISRO in communicating with **Chandrayaan-3.**

➢ **Education & Human Capital:** Educational exchanges create long-term bilateral bridges through knowledge transfer.

❍ The **Indian diaspora in the US** contributes significantly to both economies. Over 200,000 Indian students in the US contribute **$7.7 billion annually to the US economy.**

- Also, in 2023, the leading recipients of remittance from US was **India ($125 billion)**

What are the Key Issues in India-US Relations?

- **Trade Tensions:** Persistent trade disputes **over tariffs, market access, and intellectual property rights** strain bilateral economic ties.
  - **India's protectionist measures** and US demands for greater market access create friction.
  - **Digital services tax** and data localization policies remain contentious.
  - India has a trade surplus of **$36.74 billion with the U.S. in 2023-24** that is a concern for the US.
  - India has regularly been listed on the **'priority watch' list** in the **Special 301 Report,** highlighting ongoing concerns about IP protection, enforcement, and market access for **American intellectual property stakeholders.**
- **Strategic Autonomy vs. Alliance Expectations**: India's independent foreign policy, particularly regarding **Russia, Palestine and Iran**, creates tensions with US strategic objectives.
  - US expectations o**f alliance-like behavior clash with India's all-alignment approach.**
  - **Defense purchases from Russia** remain a point of contention.
    - **65% of India's weapons** purchases of more than $60 billion during the last two decades
    - Despite **CAATSA threat,** India proceeded with the **S-400 missile system purchase from Russia** in 2022.
- **Data Privacy and Digital Governance**: Divergent approaches to **data privacy and digital governance** create business uncertainties.
  - India's data localization requirements affect US tech companies' operations. Different standards for **digital trade and e-commerce affect market access.**
  - India's data localization rules affect operations of the majority of **US tech companies in India.**
- **Visa and Immigration Issues**: Restrictions on **H-1B visas affect Indian IT sector** and professionals.
  - US concerns about **visa overstay and immigration fraud** lead to stricter policies. Work permit delays affect business operations.
  - India's top seven IT services companies saw a **56% decline in their usage of the H-1B visa** over the last 8 years.
  - Reports from U.S. Citizenship and Immigration Services (USCIS) indicate that over **1 million Indians are awaiting green cards**, with some **facing wait times of up to 50 years** due to annual quotas and per-country limitations.
- **China Factor**: Different approaches to managing China's rise create strategic uncertainties.
  - The US has expressed that it is shifting its policy on China from **decoupling to de-risking.** US expectations of Indian role in the Indo-Pacific sometimes exceed India's capabilities and interests. **Economic dependence on China affects both countries' strategic choices**.
  - India-China trade reached **USD 136.2 billion in 2023** despite tensions.
- **Climate Change and Energy Policy**: Disagreements over climate change commitments and responsibilities persist.
  - US pressure for **faster transition conflicts** with **India's development needs.** Energy security concerns affect climate policy alignment.
  - India recently called for **developed countries** (including US) to provide **"at least" $1 trillion per year** in climate finance to developing countries from **2025** for taking required actions to face the challenges of global warming.
- **Agriculture and Food Security**: Disputes over **agricultural subsidies and market access affect trade relations.** Different approaches to GM crops and food standards create barriers.
  - WTO disputes over **agricultural issues** strain bilateral ties
  - WTO members, including the US, have raised questions on **India's $48 billion farm input subsidies for 2022-23.**
  - While **mustard oil** is an integral part of Indian foods, it has been banned in several places like the US **due to erucic acid.**

What Future Prospects can India and the US Explore to Strengthen Their Partnership?

- **Defense Technology Partnership 2.0:** A revitalized defense partnership focusing on **next-generation technologies** represents a critical opportunity for both nations.
  - The establishment of **joint research centers specializing in AI in Warfare, and hypersonics** would create a foundation for technological sovereignty.
  - Fast-track approval mechanisms for **defense technology transfers could overcome current bureaucratic hurdles**, while joint production facilities in India would align with **Make in India objectives**.
  - This enhanced partnership could significantly reduce dependence on traditional defense suppliers while fostering indigenous capabilities.

- **Strategic Supply Chain Resilience:** Building resilient supply chains has become **imperative in the post-pandemic world**.
  - The focus should be on **developing alternative supply routes for critical minerals and rare earth elements as India joins the US-led Mineral Security Network**, reducing dependence on single-source countries.
  - **Joint semiconductor manufacturing initiatives in India** could address global chip shortages and reduce dependence on China while creating high-skilled employment.
  - Dedicated industrial parks for **US companies relocating from China would facilitate investment,** while standardized supply chain security protocols would ensure reliability.
- **Energy Security Cooperation**: The energy sector presents significant opportunities for bilateral cooperation.
  - **Long-term LNG supply agreements** with stable pricing mechanisms could enhance energy security for India while providing market access for US suppliers.
  - Joint renewable energy projects, particularly **in solar and green hydrogen,** would support climate goals.
  - Joint **energy storage research and production facilities** would address critical infrastructure needs, while clean energy startup funds would foster innovation.
- **Digital Economy Framework:** Digital cooperation represents a frontier for bilateral relations.
  - Developing **common standards for data privacy and cross-border data flows** would facilitate digital trade while protecting consumer interests.
  - **Joint certification systems for digital security products** would enhance cybersecurity.
  - A **bilateral fintech regulatory sandbox** could promote innovation in financial services.
- **Healthcare Partnership Enhancement:** Healthcare collaboration has gained new significance post-pandemic.
  - **Joint vaccine development and production facilities** would enhance global health security while leveraging India's pharmaceutical capabilities.
  - **Telemedicine infrastructure connecting both countries** could improve healthcare access in remote areas.
  - Joint research programs focusing on **tropical and emerging diseases would address global health challenges.**
- **Climate Action Collaboration:** Climate change presents an opportunity for meaningful bilateral cooperation.
  - A **joint carbon trading mechanism** could help both countries meet their emission reduction targets while creating economic opportunities.
  - **Bilateral green technology transfer frameworks** would accelerate clean technology adoption.
  - Joint climate-resilient infrastructure projects could demonstrate practical solutions.
- **Educational and Research Integration:** Education partnership needs evolution beyond traditional student exchange programs.
  - **Joint degree programs in strategic sectors like AI, quantum computing, and biotechnology** would create a specialized workforce for future industries.
  - Research centers of excellence focusing on **emerging technologies under US-India initiative on Critical and Emerging Technology (iCET)** could drive innovation while addressing local challenges.
- **Strategic Regional Cooperation:** Regional cooperation must adapt to evolving Indo-Pacific dynamics.
  - Joint infrastructure projects in **strategic locations** would enhance connectivity while providing alternatives to **China's BRI.**
  - Trilateral partnerships with countries like **Japan, Australia, and France could create synergistic benefits.**
  - A joint maritime security framework would ensure **free navigation and trade flows.**
- **Cultural and Soft Power Exchange:** Cultural ties need institutional frameworks. Joint media production platforms would create **content reflecting shared values.**
  - Programs for **traditional knowledge preservation** in both countries would protect cultural heritage.
  - Bilateral sports development initiatives (like the recent **ICC T20 World Cup 2024** in America) would engage more youth.

Conclusion:

The **US-India relationship** is a multi-faceted partnership with immense potential. While challenges persist, areas like **defense, technology, and trade offer significant opportunities**. By addressing trade disputes, fostering trust on strategic issues, and collaborating on global challenges, **India and the US** can elevate their partnership to new heights, benefiting both nations and contributing positively to the global order.

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Addressing Air Pollution Crisis Through Systemic Change

This editorial is based on "Tackling NCR's air pollution needs sustainable focus, not quick fixes" which was published in Business Standard on 04/11/2024. The article discusses that Delhi's air pollution crisis requires systemic, long-term solutions focusing on emissions reduction and carbon capture. A joint effort across governments and sectors is essential for meaningful change.

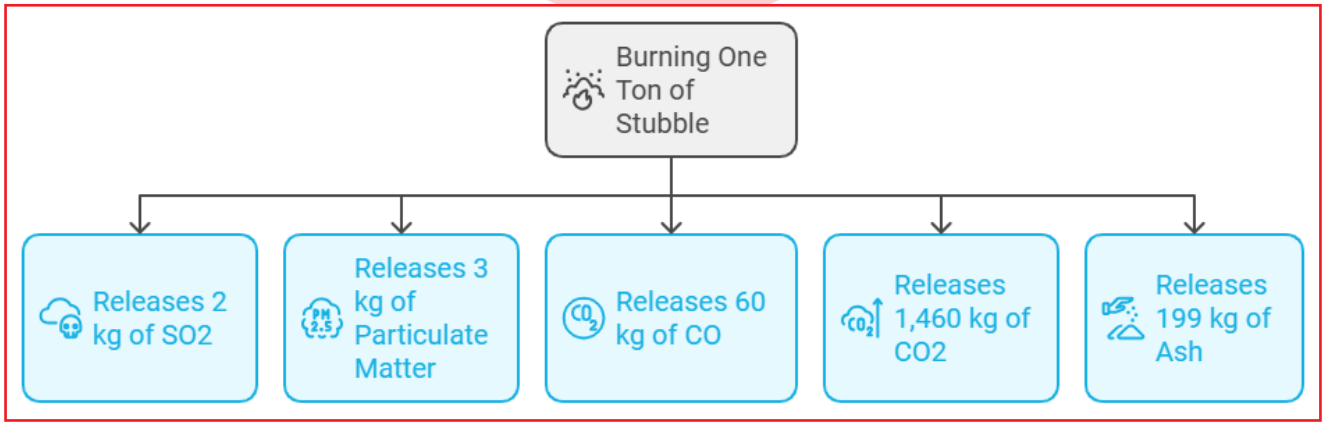
Tag: GS Paper - 3, Environmental Pollution & Degradation, GS Paper - 2, Government Policies & Interventions

With the onset of winter, **air pollution** **in Delhi** and the **Gangetic Plain** reaches hazardous levels, driven by **crop residue burning**, **vehicular emissions**, and **industrial pollution**. Despite government efforts, **stubble burning** remains a major contributor to **PM2.5** spikes, especially during harvest.

The **Centre for Science and Environment (CSE)** points to persistent pollution from **local sources**, particularly **vehicles**, despite initiatives like the **CNG program** and the **phase-out of old vehicles**. Compounded by **congestion**, an overburdened **public transport system**, and insufficient investments in **clean energy**, the region's air quality crisis demands bold, **systemic changes** to break the annual pollution cycle and secure cleaner air.

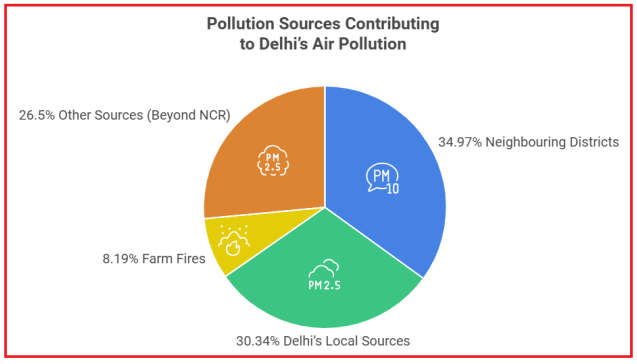
What are the Causes of Air Pollution in Delhi and the Gangetic Plain?

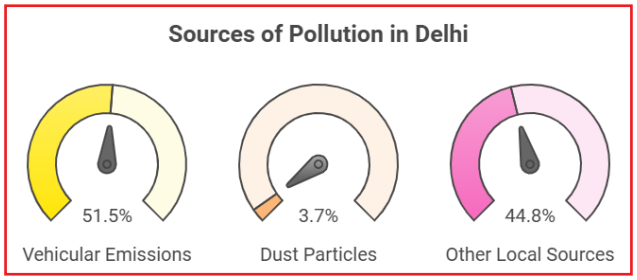
- **Stubble Burning in Northern India:** The annual crop-residue burning in **Punjab, Haryana, and Uttar Pradesh** contributes significantly to the seasonal air pollution surge.
  - Out of **400,461** cases of stubble burning across six states in 2024, **Punjab** reported 296,670 (**74%** of cases), followed by 50,242 in **Madhya Pradesh**.
  - There has been a decline in such incidents in 2024 but economic constraints and limited alternatives continue to drive the practice.
  - Also, as per a study of **Indian Agriculture Research Institute (IARI)**, **Uttar Pradesh** has recorded a rise of around **38%** in the incidents of stubble burning in Sep-Oct as compared to corresponding period 2023.
  - During October and November, stubble burning contributes **25-30%** to air pollution in Delhi on peak days.



- **Vehicle Emissions:** Data from the **Centre for Science and Environment (CSE)** indicates that **local pollution sources** in Delhi contribute **30.34%** of the city's air pollution, with **transportation** responsible for **50.1%** of this.
  - Studies by **Indian Institute of Technology Kanpur**, **The Energy Research Institute** and **Indian Institute of Tropical Meteorology-SAFAR** show vehicles contribute **40% of PM2.5 emissions** and **81% of nitrogen oxides (NOx)** in India.
  - India produced **25.9 million** vehicles in FY23, including the largest tractor and **third-largest** heavy truck output. Slow **electric vehicle (EV)** adoption and limited public transport sustain high emissions.
- **Industrial Emissions:** Delhi NCR region's power plants, especially coal-based ones, contribute heavily to **SO2 and NOx emissions**, with only **5%** of India's coal plants equipped with sulfur emission control systems.
  - Critically polluted industrial clusters, like those identified by the **Central Pollution Control Board (CPCB)** in Delhi-NCR, face frequent relaxation in pollution norms, affecting air quality further.
  - **Industrial emissions**, combined with lax enforcement, remain a large contributor to regional pollution, exacerbating the winter haze.

- **Construction and Urban Development:** Urban construction, a year-round activity in Delhi and neighboring states, contributes **30% of PM10** and **8% of PM2.5** emissions, according to the **2019 London Atmospheric Emissions Inventory**.
  - **Dust management** remains inadequate, and construction sites often fail to deploy **anti-smog guns**, further elevating particulate levels in **Delhi-NCR**, particularly during winter when weather conditions prevent pollutant dispersion.
- **Climatic Factors:** Climate change has intensified atmospheric stagnation in winter, with unusual October rain patterns worsening air quality by trapping pollutants.
  - As temperatures fall, an **inversion layer forms**, preventing pollutants from dispersing, while calm winds in the **Indo-Gangetic Plain** further restrict pollutant movement.
- **Implementational Gaps:** A recent submission by the **Environment Ministry** to the National Green Tribunal highlighted significant gaps in the National Clean Air Programme (NCAP) implementation, particularly in Delhi, where **68%** of allocated funds remain **unutilised**.
  - Among NCR cities, Faridabad, Ghaziabad, and Noida showed varying fund utilisation rates, with Noida at **11%**.
- **High AQI Levels:** In Uttar Pradesh, cities like **Noida, Ghaziabad, Moradabad and Lucknow** frequently record hazardous air quality levels, with PM2.5 concentrations exceeding national standards.
  - Also, the **Central Pollution Control Board (CPCB)** data from 2023 showed that the average air quality index (AQI) of Patna stood at 332, additionally in 2023, 7 cities of Bihar were among top 10 polluted cities of India.





What are the Challenges posed by Air Pollution?

- **Violates Constitutional Rights:** Air pollution violates Article 21 of the **Constitution**, which guarantees the **right to life**.
  - Poor air quality deprives citizens of their **right to a healthy environment,** directly impacting their **health, well-being**, and overall quality of life.
  - It also contravenes **SDG 3 (Good Health and Well-being)**, undermining global efforts toward sustainable development.
- **Severe Health Impact**: Air pollution during winter in Delhi NCR and the Gangetic Plain leads to high levels of PM2.5, which significantly increases respiratory and cardiovascular diseases.
  - As per a study by the **Indian Institute of Technology (IIT), Kanpur**, air pollution in Delhi alone causes approximately 10,000 premature deaths annually.
  - Also, According to the latest Air Quality Life Index 2024 report by the **Energy Policy Institute at the University of Chicago (EPIC)** Delhiites could lose 11.9 years of life expectancy due to high PM2.5 pollution, exceeding WHO's safe limits.
- **Vulnerable Groups at Risk**: The **elderly, children**, and people with pre-existing conditions suffer the most from winter pollution, with studies showing a rise in asthma, and lung cancer cases.
- **Reduced Visibility and Traffic Accidents**: Dense smog reduces visibility to less than 50 meters, causing disruptions in transport and a higher risk of road accidents.
- **Economic Burden**: The economic cost of air pollution, including healthcare costs and lost productivity, is estimated high.
  - As per an estimate by **Clean Air Fund (CAF), air pollution** costs Indian businesses **USD 95 billion** or 3% of India's GDP every year.
- **Loss of Education and Productivity**: Poor air quality leads to school closures and absenteeism, particularly among children, disrupting education.
  - Each winter, the Delhi government is forced to close schools for several days due to the region's high pollution levels.
  - Also, a study by the **EPIC** found that air pollution can reduce students' cognitive performance, resulting in long-term impacts on learning outcomes.

What are the Measures Taken to Curb Air Pollution?

- Policy Interventions and Regulation:

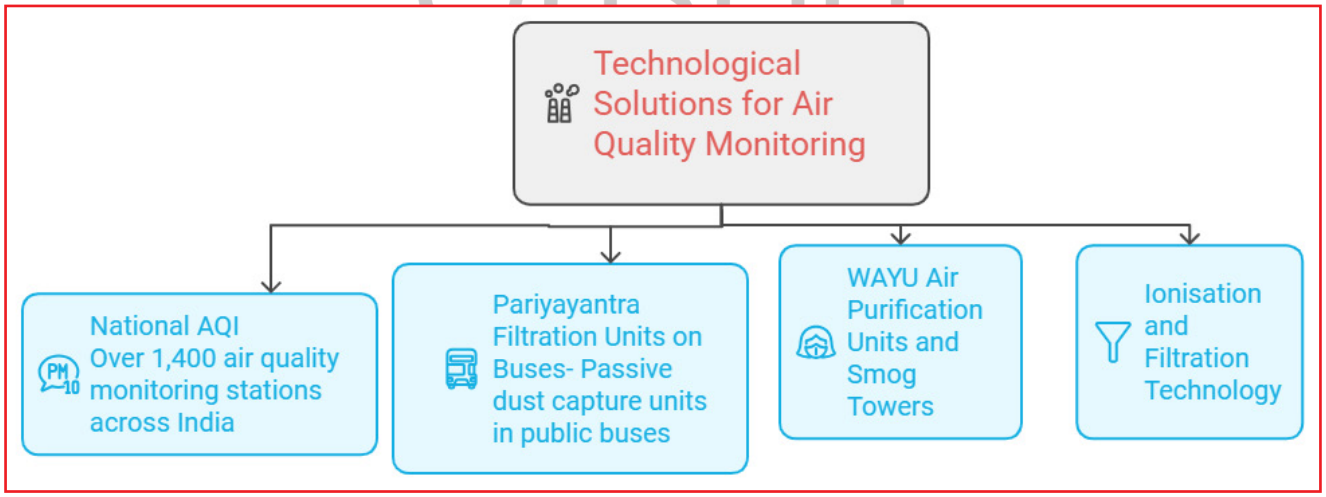
- **National Clean Air Programme (NCAP)**: Launched in 2019, the **NCAP** targets a **40%** reduction in PM10 levels by 2025-26 across 131 cities, showing improvement in 88 cities as of FY 2023.
- **Graded Response Action Plan (GRAP)**: Implemented by the CPCB, **GRAP** enforces stricter pollution control based on **AQI levels**, particularly in Delhi-NCR.
  - Revised in 2022, GRAP now includes specific directives for industries to switch to cleaner fuels and imposes dust control protocols.
- **Comprehensive Action Plan (CAP)**: The **CAP**, implemented by the **Delhi government** in coordination with various departments, targets air pollution through measures like **stricter vehicular emissions controls**, **improved industrial regulations**, **stubble burning mitigation**, **better construction site management**, and **public awareness**.
- **CAAQMS**: **CAAQMS (Continuous Ambient Air Quality Monitoring Stations)** are automated systems used to measure and monitor air quality in real-time across the country.
  - These stations collect data on pollutants like **PM2.5**, **PM10**, **NOx**, **SO2**, and **CO**, which helps assess air quality, inform policy decisions, and track progress in pollution control efforts.
- **Penalties**: To combat rising air pollution, in November 2024, the **Central government** doubled the fines for farmers burning crop residue in several northern states.

➢ **Vehicular Emissions Control:**

- **Bharat Stage Emission Standards 6**: **BS-VI standards**, rolled out in April 2020, regulate both fuel quality and vehicle emissions, targeting a reduction in **vehicular pollutants**.
- **Alternative Fuels**: **FAME-II Scheme** supports the adoption of electric vehicles, while the **SATAT Scheme** promotes **Compressed biogas (CBG)** production to encourage alternative fuel use.
- **Expressways and Highway Projects**: New highways are designed to divert traffic away from major cities, aiming to reduce congestion and emissions within urban zones.

➢ Industrial Emission Standards:

- New **SO_2 and NOx emission limits** were introduced for thermal power plants; 56 industrial sectors have stricter emission standards.
- **Online Continuous Emission Monitoring Systems (OCEMS)** are mandated for high-polluting sectors, although only partial compliance has been achieved.
- To combat coal-related emissions, **Pet coke** and **furnace oil** have been banned in NCR states.



➢ Measures to Curb Stubble Burning:

- **Subsidies for Crop Residue Management**: The government provides **financial assistance** for machinery to manage crop residue without burning, but adoption has been slow due to limited incentives.
- **Crop Diversification**: Efforts to reduce paddy cultivation in **Punjab and Haryana** have been promoted to address the root cause of stubble burning.
- **Pelletization and Biomass Utilization**: Financial support has been provided for the creation of **pellets from stubble**, a **renewable fuel** alternative, which thermal plants can use in place of coal.

- Also, since 2020, the Delhi government has been using **Pusa bio-decomposer**, a microbial solution that breaks down paddy residue within 15-20 days, to curb stubble burning in the city.

➢ **Indoor Air Quality Improvement Efforts**

❍ **Pradhan Mantri Ujjwala Yojana (PMUY)**: Provides LPG connections to reduce reliance on solid fuels, though **53%** of households still practice "**fuel stacking**," using solid fuels alongside **LPG**.

- Retrofitting older vehicles with emission control devices has been piloted, but widespread adoption is pending due to cost constraints.

What Should be Road Ahead to Combat Air Pollution?

➢ **Comprehensive Crop Residue Management:**

❍ **Direct Government Intervention:** The government should take on the responsibility of purchasing crop residues from farmers at **remunerative prices**.

- This would not only ensure that all crop waste is collected but also incentivize its conversion into pellets for energy use, addressing both **waste disposal** and **energy generation** simultaneously.

❍ **Localized Pellet Production:** Setting up pellet conversion plants near **agricultural markets** (mandis) would reduce transportation costs, making **biomass energy** production more economically viable.

- These plants would transform crop residues into pellets, providing a **sustainable energy source** while reducing the environmental impact of open-field burning.

➢ **Accelerated Transition to Clean Energy:**

❍ **Enhanced Renewable Energy Targets:** India's ambitious target of achieving **500 GW of non-fossil fuel capacity** by 2030 should be further supported by expanding **renewable energy** projects like rooftop solar and green hydrogen.

➢ **Improved Industrial Emission Standards and Enforcement:**

❍ **Mandatory Flue Gas Desulfurization (FGD):** To reduce **sulfur dioxide (SO_2)** emissions from coal-fired power plants, the installation of **Flue Gas Desulfurization (FGD)** systems should be made mandatory across all coal plants.

- For instance, **China** has successfully implemented such measures, significantly improving air quality, and India can follow this approach to control industrial pollution.

➢ **Modernized Urban Infrastructure:**

❍ **Urban Green Cover and Vertical Forests:** Cities like **Delhi, Mumbai, and Bangalore** should embrace urban green projects like vertical forests, **rooftop gardens**, and expanded green spaces to combat urban heat islands and reduce air pollution.

- Projects like **Aarey Colony** in Mumbai and **Miyawaki afforestation**, where urban forests are integrated into city planning, serve as successful models.

❍ **Green Building Mandates:** Integrating green architecture and sustainable building practices, as seen in **Singapore's Skyrise Greenery Incentive**, could help reduce the carbon footprint of new urban developments.

➢ **Strengthened Vehicular Emissions Control:**

❍ **Expanding Electric Vehicle (EV) Adoption:** Expanding **EV infrastructure** and providing tax benefits for **EV** owners will accelerate the adoption of cleaner transport options across India.

❍ **Congestion Pricing and Non-Motorized Transport:** Introducing congestion pricing, similar to **London's Ultra Low Emission Zone**, could reduce traffic in high-pollution zones, encouraging cleaner transportation options.

➢ **Technological and Data-Driven Air Quality Management:**

❍ **Enhanced Air Quality Monitoring and Data Accessibility**: Expanding **air quality monitoring networks** for real-time, granular data will help authorities make better decisions.

❍ **AI-based Solutions:** Solutions like **Artificial intelligence (AI)-based pollution forecasting** and **Internet of Things (IoT)**-enabled pollution sensors can provide **accurate predictions** and **continuous monitoring**, enabling more proactive and targeted responses to air quality issues.

Conclusion

To solve the recurring air pollution crisis in Delhi and other parts of India, a **systemic approach** is essential. The government must take responsibility for **buying crop waste** and converting it into **biomass pellets** for **thermal plants**, reducing **stubble burning**. This strategy requires **political will**, coordination, and **long-term investments** in clean energy and **public transport**. A sustained, integrated effort can deliver cleaner air, better health, and a greener, more sustainable future for India.

■■■

India's Industrial Future: The Power of Clusters

This editorial is based on "Industrial cities, parks key to Viksit Bharat" which was published in The Hindu on 08/11/2024. The article brings into picture the emergence of industrial cities and corridors, backed by a ₹28,602 crore investment, as key drivers in India's ambition to become a USD 30-trillion economy by 2047. Projects like the Delhi-Mumbai Industrial Corridor aim to connect urban and rural centers, fostering innovation and growth.

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

As India envisions its transformation into a **USD 30-trillion economy** under **Viksit Bharat@2047**, **industrial cities and corridors** are emerging as the backbone of this ambitious journey. The recent approval of 12 new industrial cities under the **National Industrial Corridor Development Programme,** backed by a **₹28,602 crore investment,** signals India's commitment to becoming a global manufacturing hub. These industrial corridors, exemplified by projects like the **Delhi-Mumbai Industrial Corridor,** are set to create a multiplier effect by connecting urban and rural centers while fostering innovation hubs.

What is the Role of Industrial Clusters in Driving India's Development Journey?

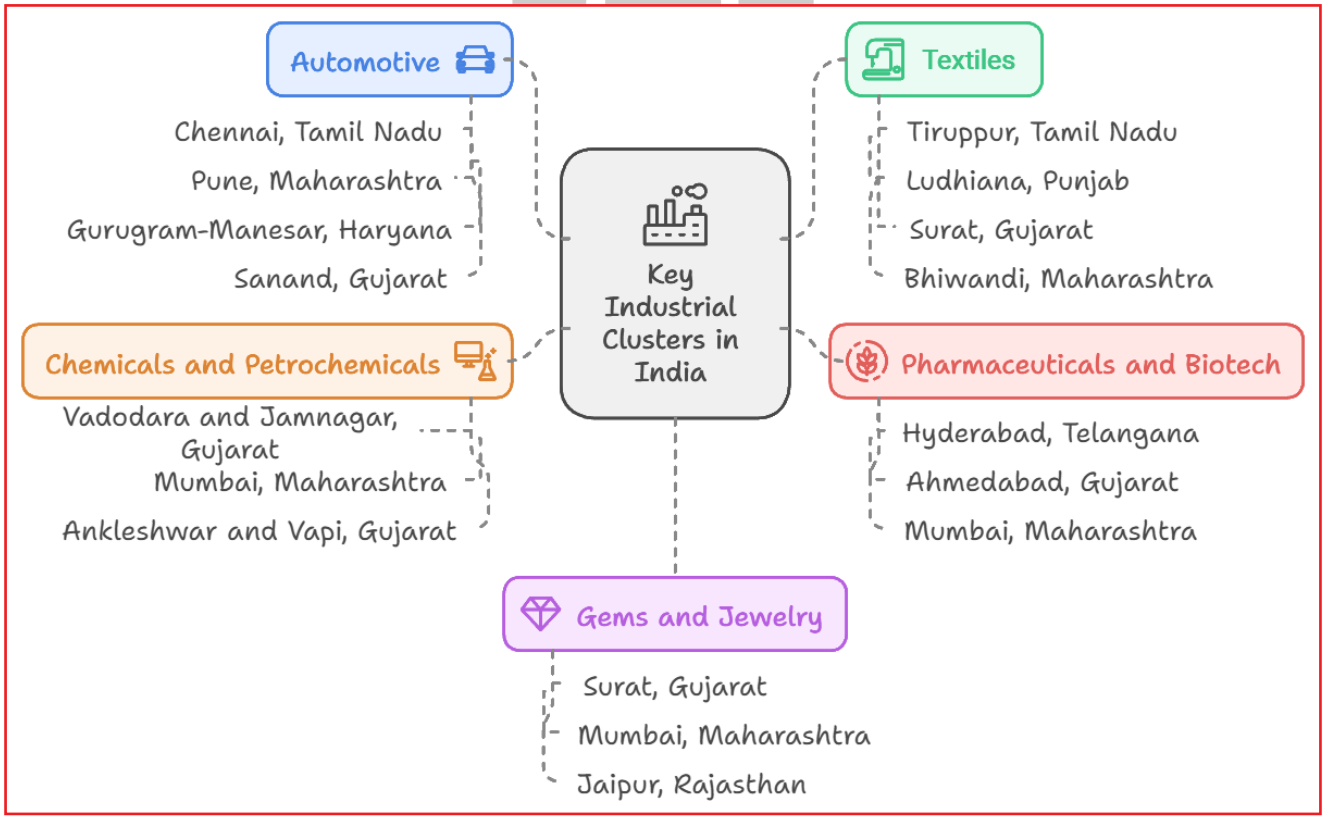
- **Economic Scale and Integration:** Manufacturing clusters create powerful economies of scale through shared infrastructure and resources, **significantly reducing operational costs for businesses of all sizes.**
  - The recent approval of **12 new industrial cities under NICDP** demonstrates India's commitment to this model.
  - These clusters are projected to generate **1 million direct and 3 million indirect jobs**.
- **Supply Chain Optimization and Cost Efficiency: Gujarat's Pharmaceutical cluster** in **Ahmedabad-Vadodara corridor** exemplifies how clustering reduces logistics costs through shared infrastructure and proximate supplier networks.
  - The cluster accounts for **28% of India's pharma exports**, with 130 U.S. Food and Drug Administration certified drug manufacturing facilities.
  - The integration of suppliers, manufacturers, and distributors in close proximity creates significant **cost advantages and operational efficiencies**.
- **MSME Growth Catalyst:** Industrial clusters serve as critical growth engines for **MSMEs** by providing them access to **established supply chains, modern infrastructure, and market linkages.**
  - The ecosystem approach **enables smaller businesses to benefit from proximity to larger anchor companies,** as evidenced by **Vedanta's recent announcement to establish two industrial parks** for aluminum, zinc, and silver processing on a not-for-profit basis.
- **Export Competitiveness:** Industrial clusters significantly enhance India's export competitiveness by **creating specialized manufacturing ecosystems that can compete globally.**
  - The focused development of sector-specific clusters, supported by initiatives like **Production-Linked Incentives (PLI)** and integrated infrastructure through **PM Gati Shakti,** is transforming India's export capabilities.
  - The **Surat diamond industry processes 85-90% of the world's rough diamonds** and has a reputation for cutting-edge technology and skilled personnel, making it a vital player in the global diamond trade.
- **Regional Development Catalyst:** Industrial corridors are proving to be **powerful drivers of balanced regional development** by connecting urban and rural areas and creating new economic opportunities.
  - This is exemplified by how the **Chennai-Bengaluru Industrial Corridor** has spurred development in smaller towns along its route, creating new growth centers.
  - Recent data reveals that regions around industrial corridors have experienced a **higher GDP growth rate compared to non-corridor regions.**
- **FDI Attraction Centers:** Industrial clusters have emerged as **powerful magnets for Foreign Direct Investment,** offering ready-to-use infrastructure and clear policy frameworks.
  - The success is evident in cases like **Toyota's recent investment in Sambhajinagar** and the **growing interest from global manufacturers** in sectors ranging from electronics to pharmaceuticals.

What are the Key Industrial Clusters in India?

- **Automotive:**
  - **Chennai, Tamil Nadu:** Known as the "Detroit of India," hosts major manufacturers like Ford, Hyundai, and BMW.
  - **Pune, Maharashtra:** Focuses on passenger and commercial vehicles, with Tata Motors, Mercedes-Benz, and Bajaj Auto.

- **Gurugram-Manesar, Haryana:** Home to Maruti Suzuki and Hero MotoCorp.
- **Sanand, Gujarat:** Notable for Tata Motors and previously Ford.

- **Textiles:**
  - **Tiruppur, Tamil Nadu:** "Knitwear Capital of India," specializing in cotton garments for export.
  - **Ludhiana, Punjab:** Known for woolen apparel and knitwear.
  - **Surat, Gujarat:** Synthetic textile hub and major polyester producer.
  - **Bhiwandi, Maharashtra:** Power loom industry for synthetic and cotton fabrics.
- **Pharmaceuticals and Biotech:**
  - **Hyderabad, Telangana ("Genome Valley"):** Center for pharmaceutical and biotech research with Dr. Reddy's Laboratories.
  - **Ahmedabad, Gujarat:** Houses Zydus Cadila and Torrent Pharma for bulk drug manufacturing.
  - **Mumbai, Maharashtra:** Home to Lupin, Sun Pharmaceuticals, and other formulation developers.
- Chemicals and Petrochemicals:
  - **Vadodara and Jamnagar, Gujarat:** Leading hubs, with Jamnagar hosting Reliance's oil refinery.
  - **Mumbai, Maharashtra:** Major port city for chemical and petrochemical industries.
  - **Ankleshwar and Vapi, Gujarat:** Key regions for chemicals and dye production.
- Gems and Jewelry:
  - **Surat, Gujarat:** World leader in diamond cutting and polishing.
  - **Mumbai, Maharashtra:** Major center for gold jewelry manufacturing and diamond trade.
  - **Jaipur, Rajasthan:** Renowned for colored gemstones, including cutting and polishing of precious stones.



What are the Major Challenges Limiting the Growth of India's Industrial Sector?

- **Infrastructure Bottlenecks**: India's logistics costs account for **14-18% of GDP (Economic Survey 2022-23) compared to 8-10% in developed economies,** significantly impacting industrial competitiveness.
  - For several years now, **electricity distribution companies (discoms)**, which are mostly **state-owned,** have witnessed steep financial losses.

- Between **2017-18 and 2022-23**, losses accumulated to over **3 lakh crore rupees.**

- **Land Acquisition Challenges:** Complex land laws and lengthy legal procedures delay projects, making acquisition difficult.
  - **Bengaluru Peripheral Ring Road** project has been delayed for years due to land acquisition issues
  - Cost overruns and delays plague over **1,800 infrastructure projects (Ministry of Statistics and Programme Implementation).**
  - **Surging land prices** are also triggering increased legal disputes over ownership conflicts, prolonging already stalled projects.
  - Additionally**, land is a state subject**, and **the discrepancies in pricing and measurement standards** between states add further complexity.
- **Rigid Labor Laws and Skill Gaps:** The industrial sector in India faces challenges with labor reforms due to the slow implementation of recent labor codes. This issue has been highlighted by recent strikes, such as the **one at Samsung's facility in Bangalore.**
  - If the skill gap in India continues on its current trajectory, most industries will be plagued by about **75-80% skill gap issues**
  - Unemployment rate in India rose sharply to 9.2% in June 2024. The formal sector employment remains at **10% of the workforce,** indicating structural rigidities.
- **Limited Access to Credit**: India is **one of the fastest-growing economies** in the world but there exists a significant gap in accessing formal credit, especially when compared to other developed nations.
  - According to a BizFund report, **only 16% of MSMEs in India receive formal credit** leaving more than 80% of these companies under-financed or financed through informal sources.
  - As of **March, 2024**, the share of industry in bank credit **shrunk to 23.1%**
- **Technology Adoption Barriers:** Lack of scale and skill in MSMEs restricts Indian manufacturing industries from investing, modernizing and thereby adopting **Industry 4.0.**
  - The digital infrastructure gap requires investments of **$23 billion by 2025** for competitive modernization.
  - India ranks **72 out of 174 countries,** with an **AI Preparedness Index** rating of 0.49.
  - Technology adoption costs are higher for Indian industries due to **import dependencies.**
- **Environmental Compliance Challenges:** Industrial units face high compliance costs of operational expenses due to environmental regulations.
  - Also, a 2020 report stated that **18% of** highly polluting industries that were required to install online continuous emissions monitoring systems (CEMS), have not complied with the norms.
    - This is partly because **bureaucratic delays in obtaining environmental approvals** and other clearances increase a developer's overall project expense by as much as **10-12%.**
- **Global Competition and Trade Barriers**: Recent WTO data shows India's share in **global exports at 1.8%, despite being the 5th largest economy.**
  - Non-tariff barriers in key export markets affect a large number of Indian industrial exports.
    - Additionally, **green trade barriers like the** European Union's Carbon Border Adjustment Mechanism could impact key sectors like steel, potentially affecting Indian exports to the EU.
- **Research and Innovation Gap:** India's R&D spending at **0.7% of GDP** is significantly lower than **China's 2.4% and USA's 3.1%**.
  - In the past two years, India's patent filing process has seen marked improvements. However, **India's global share in patent filings remains just over 2%,** indicating a continued need for targeted initiatives

What Strategies Could India Implement to Accelerate the Development of Industrial Clusters?

- **Integrated Infrastructure Development:** Create dedicated infrastructure **SPVs (Special Purpose Vehicles) for each major industrial cluster** with targeted funding.
  - Implement **time-bound development of plug-and-play infrastructure facilities** including 24x7 power, water supply, and waste management systems.
  - Develop more **multi-modal logistics parks under Gati Shakti** within clusters with direct connectivity to **ports, airports, and freight corridors.**
  - Set up **common facility centers housing testing labs, design centers, and R&D facilities** shared by cluster members.
- **Technology Innovation Centers**: Establish cluster-specific **Centers of Excellence in partnership with premier technical institutions (IITs/NITs)** and industry leaders.
  - Create shared prototyping and testing facilities equipped with advanced manufacturing technologies like **3D printing and robotics**.

- Implement **cloud-based common platforms for design, simulation, and virtual manufacturing capabilities.**
- Provide **subsidized access to Industry 4.0 technologies for MSMEs within clusters**.
- The recent success of **Pune's Auto Cluster Development and Research Institute,** demonstrates this approach's effectiveness.

➢ **Financial Support Framework:** Create dedicated cluster development funds with participation from **government, industry, and financial institutions.**
- Implement credit guarantee schemes specifically designed for **cluster MSMEs.**
- Develop supply chain financing programs leveraging the **strength of anchor companies.**
- Set up fintech platforms for **invoice discounting and peer-to-peer lending within clusters.**

➢ **Environmental Sustainability Initiatives:** Develop **common effluent treatment plants and waste management facilities** with modern technologies.
- Implement **cluster-wide renewable energy projects** including solar parks and waste-to-energy plants.
- Create **circular economy networks** within clusters for resource optimization and waste reduction.
- Establish **green rating systems with incentives for environmentally conscious units.**

➢ **Market Linkage Programs:** Establish **digital B2B platforms** connecting cluster members with domestic and international buyers.
- Develop **export facilitation centers providing documentation and compliance** support.
- Implement **quality certification programs aligned with international standards.** The successful example is **Surat Diamond Bourse.**

➢ **Digital Infrastructure Development**: Implement 5G networks and IoT infrastructure across industrial clusters.
- Create **digital twins of cluster infrastructure** for efficient management and maintenance.
- Develop **blockchain-based platforms for supply chain transparency** and traceability.

➢ **Social Infrastructure Support**: Develop **integrated townships with housing, healthcare, and education facilities near clusters.**
- Create public transportation networks connecting clusters with residential areas. Establish recreational facilities and social spaces within cluster areas.
- Implement **daycare centers and women-friendly workplace facilities**. The successful example is **Sri City Industrial Cluster,** where social infrastructure development improved worker retention.
  - Also, Sri City management **developed not only the industrial zone but trained manpower from neighboring villages** to support industry needs.

➢ **International Collaboration Programs**: Establish twinning arrangements with successful international clusters for knowledge exchange.
- Develop **international market intelligence cells within clusters.** Implement global best practice sharing programs across cluster members.

Conclusion:

India's industrial clusters are poised to **drive economic growth and innovation**. By addressing infrastructure bottlenecks, improving access to finance, fostering technology adoption, and prioritizing sustainability, India can **create world-class industrial hubs and progress towards SDG 9 (Industry, Innovation, and Infrastructure) and SDG 8 (Decent Work and Economic Growth).** These clusters will not only generate employment and boost exports but also contribute to the country's goal of becoming a **$30 trillion economy.**

■■■

Towards an Efficient PDS in India

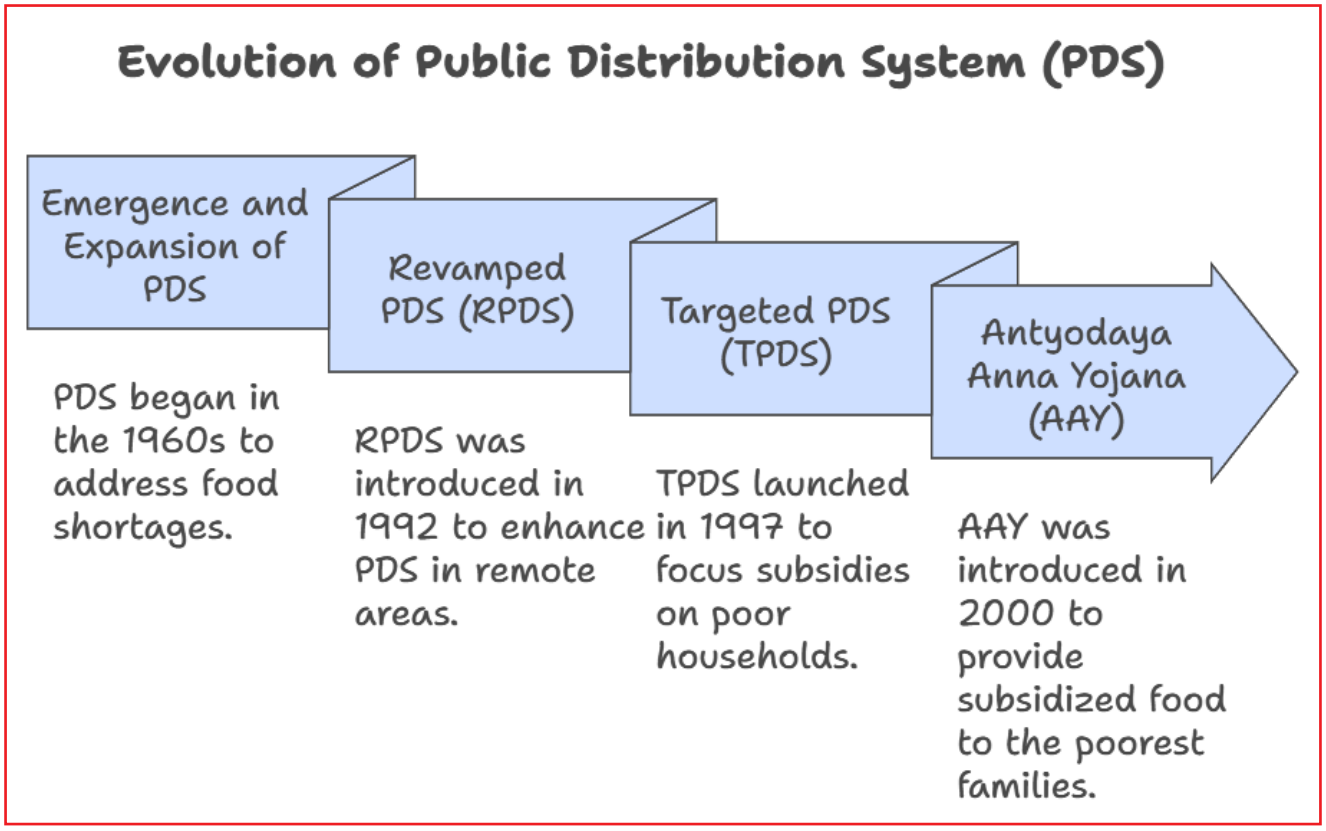
This editorial is based on "Rationalizing leaky PDS" which was published in The Hindu on 07/05/2024. The article brings into picture the inefficiencies in India's Public Distribution System (PDS), with 28% of food allocations failing to reach beneficiaries, despite improvements from point-of-sale machines. It also highlights PDS's narrow focus on rice and wheat, overlooking comprehensive nutritional security.

Tag: GS Paper - 2, Government Policies & Interventions, GS Paper - 3, Food Security,

India's Public Distribution System **(PDS)** aims to support low-income families, but a staggering **28% of allocated food never reaches them**. This translates to a massive annual loss and highlights the urgent need for reform. While leakages have decreased from **46% to 28% with point-of-sale machines**, a significant gap remains. Additionally**, PDS focuses on rice and wheat**, neglecting the broader issue of nutritional security.

What is a Public Distribution System?

- **About**: The Public Distribution System was established to address **scarcity by distributing foodgrains at affordable prices.**
  - Over time, it has become a **key policy tool for managing India's food economy,** although it supplements rather than fully meets the needs of beneficiaries.
  - It is now governed by the **National Food Security Act (NFSA) of 2013** which ensures food security for about two-thirds of India's population, based on Census 2011 data.
- **Management**: PDS is jointly managed by the **Central and State/UT governments**.
  - The Central Government, through the **Food Corporation of India (FCI),** is responsible for procurement, storage, transportation, and bulk allocation of foodgrains to states, while **State Governments oversee local distribution, identification of eligible households, issuance of ration cards, and supervision of Fair Price Shops (FPSs).**
  - Currently, PDS distributes wheat, rice, sugar, and kerosene, with some states also providing additional items like pulses, edible oils, and salt.



Why Public Distribution System is Required in India?

- **Food Security & Poverty Alleviation**: Almost **129 million** Indians are living in **extreme poverty** in 2024, on less than **$2.15 (about Rs 181) a day** (**World Bank),** making food access a critical challenge.
  - The **PDS ensures basic food security** by providing subsidized staples to vulnerable populations, acting as a crucial safety net during economic shocks and natural disasters.
  - This was particularly evident during the **Covid-19 pandemic** when **Pradhan Mantri Garib Kalyan Anna Yojana** supported 800 million people with free foodgrains.
- **Price Stabilization & Market Regulation:** PDS functions as a vital **price stabilization mechanism** by maintaining buffer stocks and controlling market volatility in essential commodities.
  - This system **helps prevent artificial price spikes** during shortages and protects consumers from market manipulation and inflation.
  - In 2022-23, the **Food Corporation of India (FCI) released 34.82 lakh tonnes of wheat to boost market supplies**, helping **regulate market prices**.

- **Agricultural Support & Farm Income:** The PDS, through its procurement mechanism, provides **assured markets and minimum support prices (MSP) to farmers,** supporting agricultural livelihoods and food production.
  - The **2023-24 agricultural marketing year** (October-September) ended with the government procuring **52.544 million tonnes (mt) of rice.**
  - This systematic procurement helped maintain farm incomes during market uncertainties.
- **Nutritional Security & Health Outcomes:** Beyond basic food security, PDS plays a crucial role in **addressing India's nutritional challenges**, particularly among vulnerable populations.
  - The system's evolution in some states to include **pulses, fortified rice (like Tamil Nadu), and other nutritious items** has helped combat malnutrition.
  - Recent data from the **National Family Health Survey-5** shows improvements in child nutrition indicators, with stunting reducing from **38.4% to 35.5%.**
- **Social Equity & Regional Balance:** PDS promotes social equity by ensuring food access **across geographical and social barriers,** particularly benefiting marginalized communities and remote regions.
  - The system's targeted approach helps reduce regional disparities and supports **vulnerable populations including SC/ST communities.**
  - Implementation of **One Nation One Ration Card** has enabled portability transactions, supporting migrant workers.

What are the Major Issues Related to India's Public Distribution System in India?

- **Leakages and Diversion:** The most critical issue plaguing PDS is the **massive leakage of foodgrains into the open market through illegal diversion**.
  - Recent **Household Consumption Expenditure Survey (HCES) 2022-23** reveals that approximately **28% of allocated grains, amounting to 19.69 million metric tonnes, fail to reach intended beneficiaries.**
  - Despite implementation of **PoS devices in 90% of fair price shops,** state-wise leakage rates remain alarming - with **Arunachal Pradesh, Nagaland, and Gujarat showing highest diversion rates.**
- **Ghost Beneficiaries and Identity Fraud:** Despite **Aadhaar linkage efforts**, the system continues to struggle with ghost beneficiaries and duplicate ration cards.
  - For instance, Odisha had over **2 lakh ghost beneficiaries under the Public Distribution System**, according to an RTI query in 2021.
  - More than **47 million bogus ration cards have been canceled between 2013 and 2021** following seeding of Aadhaar cards of beneficiaries covered under the **National Food Security Act.**
  - The problem persists particularly in states with high migration rates, **where deceased beneficiaries' cards remain active.**
- **Quality Degradation and Storage Losses:** Poor storage infrastructure leads to significant **quality deterioration and quantity losses of foodgrains.**
  - Around **74 million tonnes** of food is lost in India every year, which is **22% of foodgrain output** or **10% of total foodgrain and horticulture production.**
- **Targeting Errors and Inclusion-Exclusion Issues:** Both **inclusion of non-poor and exclusion of genuine beneficiaries** remain significant challenges.
  - World Bank (2022) data shows that **12.9% of Indians live in extreme poverty,** while the **current coverage under PMGKAY is about 57% of the population**.
    - NITI Aayog (2024) reports a sharp drop in multi-dimensional poverty, from **29.17% to 11.28% over 9 years.**
- **Corruption in Fair Price Shops:** Fair Price Shops operators often engage in malpractices like **under-weighing, overcharging, and maintaining irregular operating hours.**
  - Violations of the **TPDS (Control) Order, 2015** are punishable under the Essential Commodities Act, 1955, empowering States/UTs to act against contraventions.
  - Between 2018 and 2020, around **19,410 actions were taken by States/UTs,** including suspensions, cancellations, show-cause notices, and FIRs **against FPS licenses.**
- **Budget Constraints and Economic Burden**: Rising food subsidy bills strain government finances while efficiency remains low.
  - For 2024-25, the central government has allocated **Rs 2,05,250 crore for food subsidies**. In 2023-24, provisional actuals show **food subsidy spending was 7% higher than the budget estimate.**
- **Nutritional Inadequacy:** Current PDS focus on **cereals fails to address comprehensive nutritional needs.**
  - India faces a triple burden of **malnutrition**: **undernutrition, obesity, and micronutrient deficiencies.**

- According to a 2019-2021 report by the Food and Agriculture Organization, **224.3 million people in the country are undernourished.**
- Additionally, a **United Nations International Children's Emergency Fund** report highlights that over **80% of Indian adolescents experience "hidden hunger."**

❍ **Household Consumption Expenditure Survey (HCES)2022-23** data shows that the **share of spending on pulses and vegetables declined in 2022-23 compared to 2011-12.**

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

➢ **End-to-End Digitalization & Real-Time Monitoring:** Implement comprehensive **digital tracking** from procurement to distribution using blockchain technology and IoT sensors.

❍ Mandate **real-time stock updates** through an integrated platform connecting **FCI godowns, transport vehicles, and FPS.**

❍ Deploy AI-powered analytics at key storage and distribution points to detect **irregularities and prevent pilferage.**

➢ **Smart FPS Transformation**: Convert fair price shops into **digital-first "smart shops"** with **dispensing units, biometric authentication, and electronic weighing scales.**

❍ Integrate digital payment systems including **UPI and enable e-KYC updates at FPS level**.

❍ Implement **QR code-based quality certification system** for each grain lot. Create a **public quality monitoring dashboard with regular updates.**

➢ **Portable Benefits & Migration Support**: Strengthen One Nation One Ration Card (ONORC) implementation through **improved interstate coordination and standardized protocols.**

❍ Create a **centralized beneficiary database** with real-time migration tracking and automatic benefit transfer.

❍ Enable **temporary ration card registration** at destination states for seasonal migrants.

➢ **Storage Infrastructure Modernization:** Upgrade traditional storage to **modern silos with temperature and humidity control systems.**

❍ Install **automated grain quality monitoring systems using IoT** sensors and AI analytics.

❍ Develop **hub-and-spoke storage models with smaller, tech-enabled local storage units**.

❍ Create PPP opportunities for modern storage infrastructure development.

➢ **Nutritional Security Integration:** Convert **select FPS into nutrition hubs offering diverse food items (pulses, oils, fortified products)**.

❍ Implement **E-Rupee nutrition vouchers for vulnerable groups** (pregnant women, children).

❍ Integrating **nutrient-rich millets into PDS** can help tackle India's malnutrition, obesity, and micronutrient deficiencies.

- States like **Karnataka and Odisha** have successfully included millets, with **Odisha's Millets Mission (OMM)** providing a model for reviving millet consumption through PDS,

➢ **Crisis Response Enhancement**: Develop **automated disaster response protocols** with prepositioned stocks.

❍ Create **emergency distribution networks using mobile PDS units**. Implement special protocols for pandemic-like situations. Enable rapid beneficiary verification during emergencies using simplified procedures.

Conclusion:

India's Public Distribution System (PDS) is a vital tool for achieving several Sustainable Development Goals (SDGs): **No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-being (SDG 3), and Responsible Consumption and Production (SDG 12)**. By addressing the issues of leakage, inefficiency, and nutritional inadequacy, and implementing reforms such as **digitization, improved infrastructure, and a focus on nutritional diversity,** India can create a more efficient and effective PDS.

■■■

India's Carbon Market: A Green Leap Forward

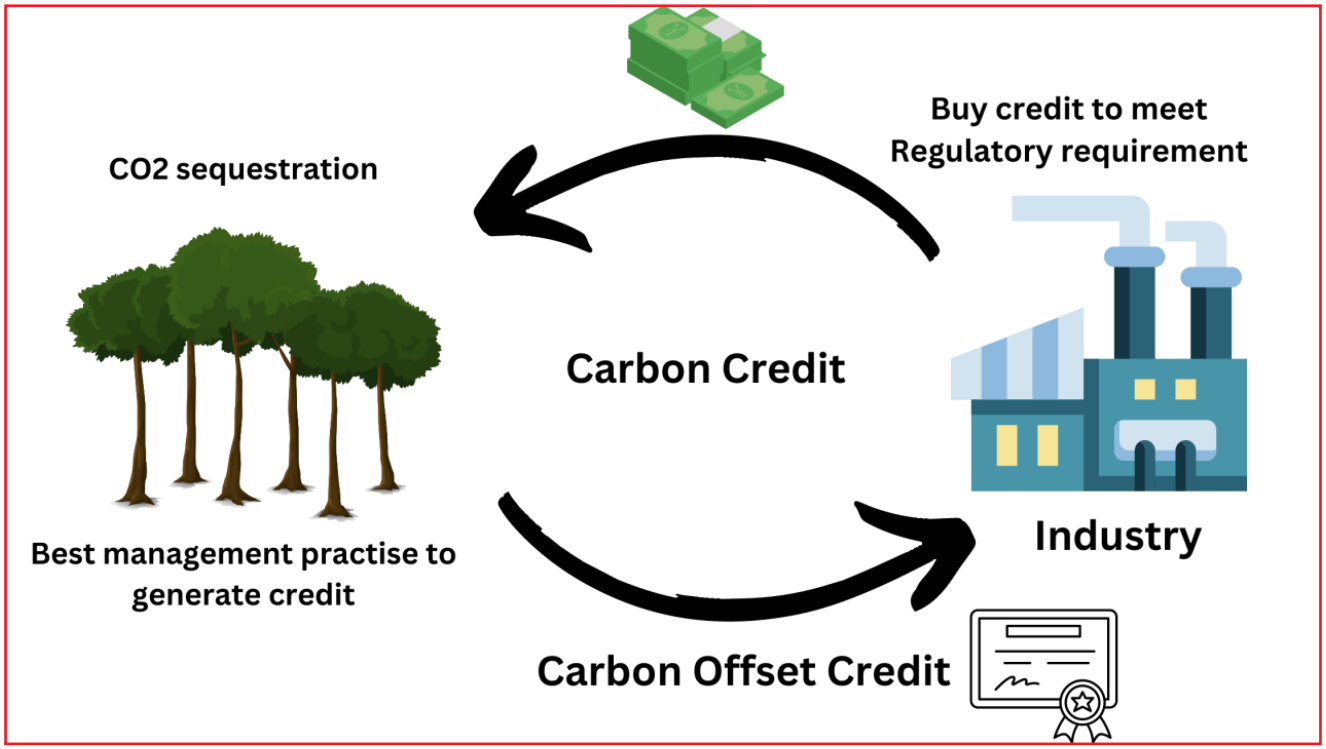
This editorial is based on "Giving shape to India's carbon credit mechanism" which was published in The Hindu on 12/11/2024. The article brings into picture the key role of carbon finance and credit frameworks at COP-29, focusing on India's efforts to develop its domestic carbon market. It highlights two major challenges: ensuring the integrity of carbon credits to avoid greenwashing and aligning with international standards, especially under Article 6 of the Paris Agreement.

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

As **COP-29** unfolds in **Baku, Azerbaijan**, **carbon finance and credit frameworks** have emerged as critical points of discussion between developed and developing nations. India, having updated its **Nationally Determined Contributions** in 2023, is poised to develop its domestic carbon market. However, global experiences highlight two crucial challenges: maintaining the integrity of carbon credits to **prevent greenwashing**, and ensuring alignment with international standards, particularly **Article 6 of the Paris Agreement**.

What are Carbon Credits?

- **About:** Carbon credits are **tradable certificates representing a claim to avoided greenhouse gas (GHG) emissions** or enhanced removals from the atmosphere.
  - They allow entities to transfer these claims to buyers, who can "retire" them to meet climate targets.
- **Certification and Units:** Credits are certified by governments or independent bodies and typically **represent one metric ton of CO_2 avoided or removed.**
  - Carbon credits, rather than "**offsets**," are the preferred term for compliance and voluntary reporting.
  - To compare GHG effects, **emissions are standardized in CO_2-equivalents (CO_2e)** using **100-year Global Warming Potentials (GWPs).**
- **Alternative Uses**: Carbon credits are also used without offsetting claims, contributing solely to climate mitigation.
  - This requires **high-quality credits that meet stringent criteria.**



What are the Opportunities for India in Developing a Domestic Carbon Market?

- **Economic Value Creation & Market Size**: India is a significant exporter of carbon credits and has issued 278 million credits in the voluntary carbon markets between 2010 and 2022, accounting for **17% of the global supply.**
  - Beyond trading, the market creates opportunities for **carbon credit verification agencies, green finance institutions, and environmental consulting firms,** potentially creating **200,000+ new jobs.**
  - The **multiplier effect** could contribute significantly to **India's goal of becoming a $5 trillion economy** while driving sustainable growth.
- **International Climate Leadership:** As the world's **third-largest emitter** yet leader in **renewable energy adoption,** India can leverage its carbon market to shape global climate finance architecture.
  - Recent leadership in initiatives like **International Solar Alliance** demonstrates India's capacity to lead climate action.

- The carbon market could **strengthen India's position in climate negotiations,** particularly in **developing-country coalitions,** while creating opportunities for **South-South cooperation** and technology transfer.

➢ **Industrial Competitiveness & Innovation:** Carbon pricing could **drive industrial modernization and innovation across sectors.**

- Industries can leverage carbon markets to fund efficiency improvements, similar to how **EU-ETS helped reduce industrial emissions** by **41% since 2005.**
- This presents opportunities for developing indigenous clean technologies, particularly in hard-to-abate sectors like cement and steel.
- Recent success stories like **JSW Steel's carbon reduction initiatives** show potential for the Indian industry to lead in low-carbon solutions.

➢ **Digital Infrastructure & Technology Integration**: India's robust digital infrastructure presents unique opportunities for creating transparent, efficient carbon markets.

- The success of **digital public goods like UPI and COWIN** provides a template for building sophisticated carbon trading platforms.
- Integration of **blockchain, IoT, and AI** could revolutionize carbon credit verification and trading, reducing costs and increasing transparency.
  - This could **position India as a leader in digital solutions for climate action.**

➢ **Green Investment Catalyst:** A well-designed carbon market could attract significant international green finance.

- ESG investments now account for nearly **18% of foreign financing** in emerging markets (excluding China)**.**
- India's carbon market could provide a **structured avenue for channeling this capital into sustainable projects,** particularly in renewable energy, energy efficiency, and forest conservation. The market mechanism could also support India's green bonds and sustainable finance initiatives.

➢ **Rural Development & Agricultural Transformation:** Carbon markets present unique opportunities for rural India **through agricultural and forestry carbon credits**.

- Recent pilot projects in states like Maharashtra show farmers earning additional income through carbon farming practices.
  - They are **making up to ₹65,000 per acre annually from forest harvest and carbon revenue**, compared to just ₹10,000 from paddy cultivation.
- The structured market could **incentivize sustainable agriculture, agroforestry, and rural renewable energy projects,** potentially benefiting farmers while supporting food security and climate resilience.

➢ **Sector Transformation Opportunities:** Different sectors present unique opportunities: Energy sector can **accelerate renewable transition, manufacturing can fund efficiency** improvements, **real estate can drive green building adoption,** and **transport sector can accelerate electric mobility.**

- Recent success of the **Performance Achieve Trade (PAT) scheme,** covering 13 energy-intensive sectors, demonstrates industry readiness for market mechanisms.
- This sectoral approach could **create specialized carbon credit categories** and trading mechanisms.

➢ **Knowledge Economy Development:** Building a carbon market **creates opportunities for developing expertise** in **carbon accounting, verification, trading, and climate finance**.

- This could position India as a **knowledge hub for emerging carbon markets** globally.
- Recent initiatives like the Climate University Network (connecting 100+ universities) show potential for building specialized skills and research capacity.
- The market could drive innovation in environmental education and professional development.

➢ **Urban Sustainability Integration:** Carbon markets could accelerate **sustainable urban development** through projects in waste management, urban forestry, and clean transport.

- Cities like **Indore, which generates revenue from waste carbon credits,** demonstrate the potential.
- The market mechanism could **support India's Smart Cities Mission, incentivizing low-carbon infrastructure** and creating new revenue streams for urban local bodies to fund climate initiatives.

What are the Major Issues Related to Development of Carbon Market in India?

➢ **Market Design & Pricing Complexity:** India faces significant challenges in designing an efficient market structure that **balances environmental goals with economic realities.**

- Setting **appropriate caps, allocating allowances, and ensuring market liquidity** while preventing price volatility requires complex policy decisions.
- The diversity of **India's industrial landscape,** with varying technological capabilities and emission intensities, makes uniform pricing mechanisms particularly challenging.
- This is **further complicated by the need to protect strategic sectors** while maintaining market effectiveness.

➢ **Measurement, Reporting & Verification Infrastructure: Current gaps in emissions data collection and verification systems** pose significant challenges.
- The challenge is magnified by I**ndia's diverse industrial base**, with **many small and medium enterprises lacking technical capacity** for accurate emissions monitoring. Establishing credible baseline emissions data across sectors remains a fundamental challenge.

➢ **Regulatory Framework & Institutional Capacity:** Despite the **Energy Conservation Amendment Act 2022,** significant regulatory gaps remain.
- Recent implementation delays in the **Green Credit Programme** highlight institutional capacity constraints.
- The need for coordination among multiple agencies (**Bureau of Energy Efficiency, Ministry of Environment, Forest and Climate Change, CERC**) creates operational complexities.
- Current regulatory frameworks may need substantial enhancement to handle complex carbon market operations.

➢ **Industry Readiness & Compliance Costs:** Many Indian industries, particularly MSMEs generate around **110 million tonnes of CO2 equivalent annually**, face significant challenges in market participation.
- The cost of compliance, including **monitoring equipment, verification processes, and trading infrastructure,** could be prohibitive for smaller players.
- Technical capacity gaps in **carbon accounting and trading strategies** could disadvantage certain sectors and regions, potentially creating market distortions.

➢ **International Market Integration Issues:** Aligning domestic carbon markets with international standards while protecting national interests presents complex challenges.
- **Article 6 negotiations at COP29** highlight **ongoing debates about corresponding adjustments and credit quality**.
- India must navigate between maintaining sovereignty over its carbon assets and ensuring international market compatibility.
- The **risk of carbon leakage through international trade** and competitiveness concerns requires careful policy design.

➢ **Double Counting & Additionality Concerns:** Ensuring credit integrity and preventing double counting remains a significant challenge.
- Recent criticism of **forestry credits under voluntary schemes**, where up to **30% faced additionality questions**, highlights verification challenges.
- The overlap between various schemes (**PAT, Renewable Energy Certificate, proposed carbon market**) creates risks of multiple counting.
- Establishing **clear ownership rights and tracking mechanisms for carbon credits** across different programs requires sophisticated systems and protocols.

➢ **Regional & Sectoral Disparities:** Significant variations in industrial development and technical capacity across states create equity concerns.
- States with **higher industrial concentration (Gujarat, Maharashtra and Rajasthan)** may dominate market dynamics.
- The risk of market benefits concentrating in **developed regions** while imposing **disproportionate costs on less developed area**s requires careful consideration.

➢ **Technology & Infrastructure Gaps:** Current technological infrastructure may be inadequate for sophisticated carbon market operations.
- Cybersecurity breaches in international carbon registries highlight technology risks.
  - In January 2011, hackers stole nearly **1.2 million credits from the Czech carbon registry** after issuing a bomb threat to its headquarters.
- Developing secure, transparent trading platforms, reliable monitoring systems, and verification technologies requires significant investment.
- The **digital divide across regions and industries** could create operational challenges and market access issues.

➢ **Market Manipulation & Speculation Risks:** Experience from other markets shows **vulnerability to price manipulation and excessive speculation**.

- An investigation found that over **90% of rainforest carbon offsets by Verra,** widely used by companies like **Disney and Shell,** may be **"phantom credits"** with little real impact on emissions.
- Furthermore, **greenwashing**—where companies claim carbon neutrality using questionable offsets—poses **a risk to market credibility and consumer trust,** further complicating the integrity of carbon markets.

What Measures can India Adopt to Accelerate the Development of Carbon Market?

- **Phased Implementation Strategy:** Adopt a tiered approach starting with **high-emission sectors (power, cement, steel)** where monitoring capabilities already exist under PAT scheme.
  - Gradually expand to **medium-emission sectors** while building capacity in smaller industries.
  - This approach, similar to **China's successful Emissions Trading System rollout**, allows market maturity while building institutional capacity.
- **Integrated Digital Infrastructure:** Develop a unified carbon registry platform integrating **blockchain technology for transparent tracking and trading**.
  - Mandate standardized **digital reporting formats and create APIs** for seamless data integration across different systems.
  - Implement **real-time monitoring and verification systems** using IoT sensors and automated data validation. This digital backbone would reduce transaction costs and enhance market transparency.
- **Capacity Building Ecosystem:** Establish a dedicated **Carbon Market Skill Development Program** targeting industry professionals, auditors, and regulators.
  - Create standardized certification programs for carbon market professionals and verification agencies. Build **industry-specific guidance** and tools for emissions calculation and reporting.
- **Dynamic Price Management System:** Implement a **price collar mechanism with floor and ceiling prices** to prevent extreme volatility while ensuring meaningful carbon pricing.
  - Create a **market stability reserve similar to EU-ETS** to manage supply-demand balance.
  - Develop **sector-specific allowance allocation methods** considering technological capabilities and international competitiveness.
- **Sectoral Integration Framework:** Create sector-specific emission intensity benchmarks and reduction pathways **aligned with India's NDCs.**
  - Develop mechanisms to link **existing schemes (PAT, REC)** with the carbon market to prevent double counting.
  - Establish **clear protocols for project-based credits from sectors not covered under cap-and-trade.**
  - Design specific provisions for hard-to-abate sectors including **alternative compliance mechanisms.** Create industry clusters for collective participation and knowledge sharing.
- **International Alignment:** Develop carbon market infrastructure aligned with **Article 6 requirements from the start.**
  - Create clear frameworks for international credit transfers and corresponding adjustments.
  - Establish **bilateral partnerships for market linking** and capacity building.
- **Regional Development Framework:** Create state-level carbon market cells for **localized support and monitoring**.
  - Develop regional carbon market development plans considering local industrial profiles.
  - Establish **mechanisms for revenue sharing with states** to incentivize participation.

Conclusion:

India's carbon market holds immense potential for sustainable development. By addressing challenges like **market design, data integrity, and regulatory frameworks**, India can create a robust and efficient market. This will drive emissions reductions, attract green investments, and position India as a global leader in climate action.

Bridging Gaps in India's Health System

This editorial is based on "SDG goals at risk in nations such as India due to declining health spending: Data" which was published in The Hindu on 13/11/2024. The article brings into focus the sharp decline in government health spending per capita in low and lower-middle-income countries, including India, threatening progress toward universal health coverage and SDG health targets amid persistent budget cuts projected through 2029.

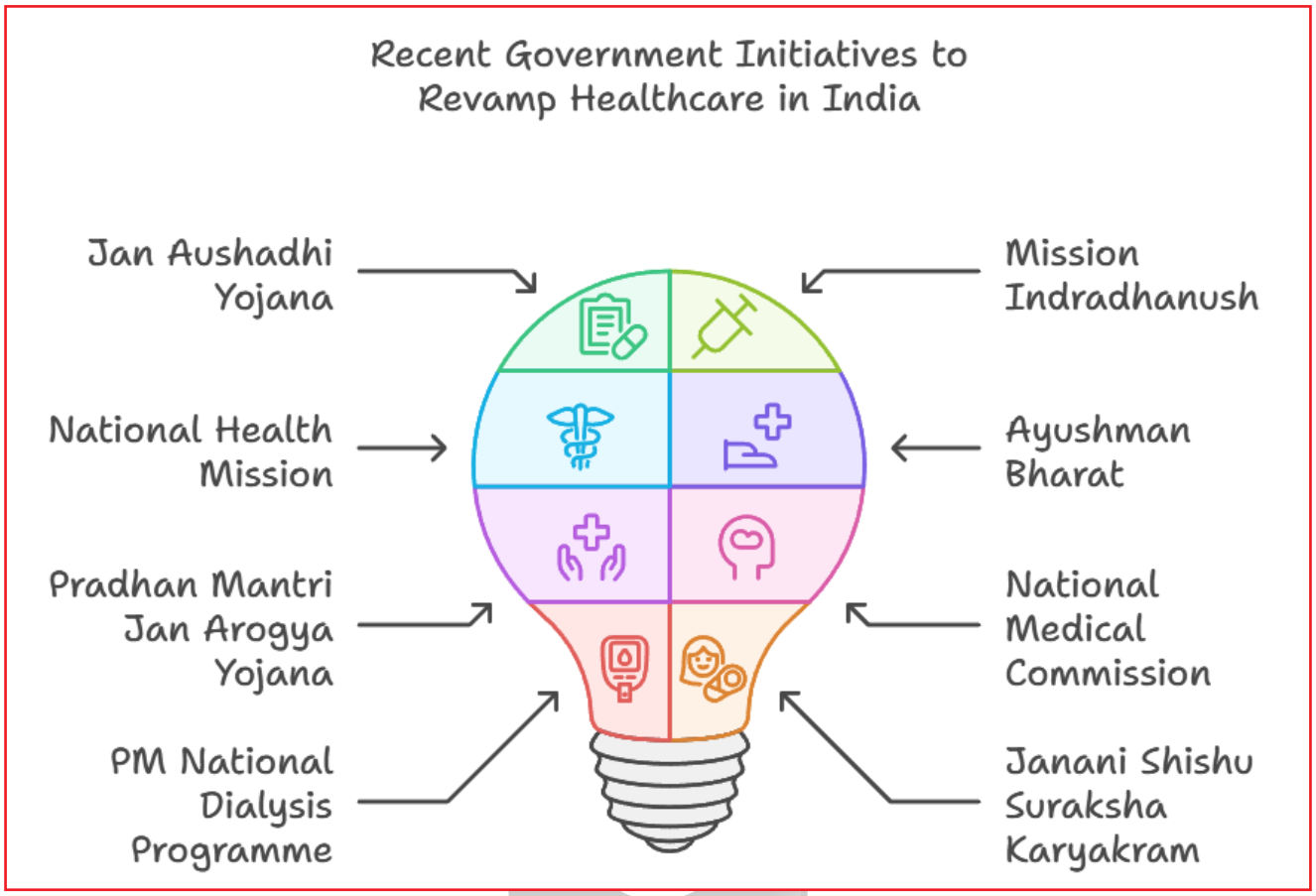
Tag: GS Paper - 2, Health, Central Sector Schemes, Issues Relating to Development, Welfare Schemes

According to a recent paper published by the World Bank, low and middle-income countries, including **India**, are facing a decline in **public health expenditure,** reversing pre-pandemic gains. A study of **63 nations**

shows a drop in health spending growth from 2.4% (pre-pandemic) to 0.9% (2019-2023). In India and 34 other countries, health budgets have also fallen as a share of national spending, down to **6.5% in 2023.** IMF projections **indicate continued budget cuts for healthcare through 2029,** raising concerns about achieving universal health coverage and **Sustainable Development Goals health goals** amidst widening infrastructure gaps.

What are the Key Emerging Health Challenges that India is Facing?

- **Climate Change-induced Health Crisis**: Rising temperatures and **extreme weather events** in India are significantly impacting public health, with **heat-related illnesses, respiratory diseases,** and **vector-borne diseases** showing alarming increases.
  - In India, **191 billion potential labor hours** were lost due to heat exposure in 2022, an increase of **54%** from 1991-2000.
    - Also, **waterborne diseases**, which are exacerbated by the rising frequency of floods, pose a significant health risk in India.
    - Floods often contaminate water sources, **leading to outbreaks of diseases like cholera, dysentery, and typhoid.**
  - Deaths due to extreme weather events rose **18% in India in just 3 years,** with notable increases in vector-borne diseases like dengue.
- **Antimicrobial Resistance (AMR) Crisis**: India faces a critical challenge with **antimicrobial resistance**, driven by **widespread misuse of antibiotics, poor sanitation, and inadequate healthcare practices.**
  - A 2022 Lancet study found that **over 47% of antibiotic formulations used in India's private sector in 2019 lacked approval from the Central Drug Regulator,** leading to widespread and often unnecessary usage.
  - Also, studies indicate a rise in **multi-drug resistant infections** in Indian hospitals, with reports of resistant strains of ***E. coli and Klebsiella pneumoniae*** increasingly found in intensive care units (ICUs).
- **Mental Health Emergency**: Post-pandemic India is witnessing an unprecedented **mental health crisis,** with **inadequate infrastructure and workforce to address growing needs.**
  - The stigma surrounding mental health, combined with limited access to quality care and insufficient insurance coverage, creates significant barriers to treatment.
  - **Covid-19 pandemic** triggered **25% increase in prevalence of anxiety** and depression worldwide (**WHO**)
  - The **National Mental Health Survey** indicates that **150 million Indians need mental health interventions,** while there are **only 0.75 psychiatrists per 100,000 population.**
- **Rising Non-communicable Diseases (NCDs):** India's epidemiological transition **shows a dramatic shift toward NCDs,** particularly diabetes, cardiovascular diseases, and cancers, affecting younger populations and creating a double burden of disease.
  - The combination of **sedentary lifestyles, urbanization, and dietary changes is accelerating this trend**, while healthcare systems struggle to adapt from infectious disease management to chronic care models.
  - NCDs are a major global health issue, causing 74% of deaths worldwide and 63% of deaths in India.
    - India now has more than **101 million people living with diabetes** compared to **70 million people in 2019**
- **Double Burden of Diseases:** India faces a "double burden of disease," dealing with both **communicable and non-communicable diseases (NCDs)** simultaneously.
  - Infectious diseases like tuberculosis, dengue, and malaria remain widespread, especially in rural and low-income areas.
    - Post-Covid-19 pandemic, India faces new challenges from emerging and re-emerging infectious diseases, with increasing concerns about **zoonotic diseases and pandemic preparedness**.
      - India reported over **3,000 cases of H3N2 influenza** in 2023.
      - In India, 30 Mpox cases have been reported since the **WHO's 2022 PHEIC Declaration.**
  - Meanwhile, the rise of NCDs such as diabetes, hypertension, cancer and cardiovascular diseases is accelerating due to lifestyle changes, urbanization, and dietary shifts.
    - Studies have estimated a **12.8% increase in the number of annual cancer cases** by the year 2025, which would be around 1.57 million.
  - This **dual challenge strains healthcare resources,** as facilities must address both communicable diseases and chronic conditions that require long-term care.



Why is India Struggling to Sustain Effective Healthcare Despite Multiple Initiatives?

- **Fragmented Governance:** India's healthcare system suffers from **fragmented governance across central, state, and local levels,** leading to inconsistent policy implementation and resource allocation.
  - States like **Kerala have robust healthcare systems** with better health indicators, while others like **Bihar lag behind.**
  - The **Clinical Establishments Act of 2010** aims to standardize healthcare services across India.
    - However, **its implementation varies by state,** leading to differences in healthcare quality and regulation enforcement.
- **Inadequate Health Care Financing:** Despite ambitious healthcare initiatives, India's public health spending **remains critically low**, with heavy reliance on private out-of-pocket expenditure.
  - Government health expenditure in India stands at 1.9% of GDP, as per the **Economic Survey 2023-24.**
  - In India, **out-of-pocket health expenditure (OOP) expenses** account for about **62.6%** of total health expenditure, one of the highest in the world
- **Infrastructure and Resource Disparities:** Urban-rural divide in healthcare infrastructure continues to widen, with significant **disparities in the distribution of medical facilities, equipment, and infrastructure.**
  - Only **11% of sub-centers, 13% of PHCs, and 16% of CHCs** meet Indian Public Health Standards.
  - A Niti Aayog report has said that about **65% of hospital beds** in the country cater to almost **50% of the population.**
- **Workforce Challenges and Brain Drain:** The healthcare sector faces severe **shortages of qualified professionals,** compounded by continuous brain drain and uneven distribution.
  - Medical education capacity, though **expanding**, **struggles with quality issues and doesn't align with healthcare needs**. Rural postings remain unattractive despite incentives.
  - The **Rural Health Statistics** report shows that there is a shortfall of more than **80% of the required surgeons and pediatricians** in the 6,064 Community Health Centres across the country.

- **Data Management and Monitoring Gaps:** Despite digital initiatives, **healthcare data remains poorly integrated,** hampering evidence-based policy-making and resource allocation.
  - The **lack of real-time health surveillance systems** affects disease monitoring and response capabilities.
  - Privacy concerns and infrastructure limitations **slow digital health adoption.**
    - Despite the government's efforts to promote Ayushman Bharat Digital Mission adoption, **only 30% of total Health Facility Registry have come from the private sector**, despite holding a 70% market share.
- **Lack of Focus on Preventive healthcare:** Focus remains p**redominantly on curative care rather than preventive healthcare** and public health measures.
  - Health education and awareness program**s receive inadequate attention and resources.** Environmental health and social determinants of health get limited policy focus.
  - The Indian government's expenditure on preventive healthcare constitutes **only 13.55% of the Current Health Expenditure (CHE).**
- **Supply chain and pharmaceutical issues:** Healthcare supply chains remain inefficient with frequent stockouts of essential medicines and equipment.
  - **Dependence on imported active pharmaceutical ingredients** affects drug security and costs.
    - Generic medicine programs face implementation and quality perception challenges.
  - India imports about **70%** of its Active Pharmaceutical Ingredient requirements from China**, particularly vitamins and antibiotics.**

What Measures can India Adopt to Strengthen the Healthcare System?

- **Integrated Digital Health Ecosystem:** India should fast-track the implementation of the **Ayushman Bharat Digital Mission** by establishing a **unified health data infrastructure** that connects all stakeholders, **from primary health centers to tertiary hospitals.**
  - This would include standardized **Electronic Health Records (EHRs),** telemedicine platforms, and real-time disease surveillance systems, while ensuring robust data privacy and security.
  - The system must **allow seamless information exchange between public and private healthcare providers,** with a focus on improving last-mile connectivity in rural areas.
  - Also, platforms like **E-Sanjeevani** can be expanded and strengthened learning from **Tamil Nadu** which has topped **eSanjeevani OPD consultations** as per a 2020 report.
- **Strengthening Primary Health Care:** Health and Wellness Centers **(HWCs)** should be transformed into **comprehensive primary care hubs**, equipped with essential diagnostics, telemedicine facilities, and trained personnel.
  - The focus should **shift to preventive care and early detection** through regular **health screenings, vaccination programs, and community health education.**
  - A **strong referral system should connect primary, secondary, and tertiary care facilities**, while local communities, through ASHAs and community health workers, can be engaged for better health awareness and preventive care.
  - **Performance-based incentives for healthcare workers** would also improve service quality and retention.
- **Public-Private Partnership Reforms:** New Public-Private Partnership (PPP) models should be **developed to ensure equitable healthcare access** while maintaining high-quality standards.
  - Clear regulatory frameworks with performance metrics, quality benchmarks, and **pricing controls should be implemented for private sector participation.**
  - **Independent monitoring systems** should be established to assess PPP outcomes and ensure accountability.
  - Furthermore, technology transfer and capacity building should be a focus of these partnerships.
- **Healthcare Financing Reform:** A mixed financing model should be adopted, **combining increased public spending with universal health insurance coverage.**
  - Public health spending should gradually be increased to **2.5% of GDP** through a dedicated health cess and optimized resource allocation.
  - Strengthening the **Ayushman Bharat scheme by expanding coverage and simplifying claim processes is essential**.
    - Recent expansion of health coverage under the Ayushman Bharat Pradhan Mantri Jan Arogya Yojana **to include all senior citizens aged 70 and above** is a significant step.
- **Medical Education and Workforce Development:** Medical education should be modernized with a focus on **practical skills, digital health, and emerging technologies.**

- A **mandatory rural posting system** with attractive incentives and career progression opportunities should be introduced.
  - **Chhattisgarh's Mitanin program**, which uses community health workers effectively to address rural doctor shortages, can serve as a model.
- A standardized **continuing medical education system with regular skill updates should be created**. Additionally, medical education hubs should be established in underserved regions, with a focus on addressing local healthcare needs.

➢ **Pharmaceutical and Medical Device Manufacturing:** India should strengthen **domestic manufacturing capabilities for essential medicines and medical devices through Production Linked Incentive schemes.**
- API parks with shared infrastructure should be developed to reduce import dependence.
- Quality control measures and **standardization for generic medicines** should be implemented to build trust in domestic products.
- The **Jan Aushadhi network** should also be strengthened with better supply chain management.

➢ **Emergency Preparedness System:** A network of regional emergency response centers should be established, with **adequate surge capacity and essential supplies.**
- Early warning systems for **disease outbreaks, with real-time monitoring capabilities,** should be implemented.
- Additionall**y, strategic reserves of essential medicines** and equipment should be built and regularly rotated.

➢ **Preventive Healthcare Focus:** Comprehensive health screening programs should be implemented across all age groups at **HWCs**.
- Integrating **traditional medicine systems (AYUSH)** with modern medicine could offer a holistic approach to healthcare.
- **Targeted interventions for lifestyle diseases** should be introduced through workplace and school health programs.
  - Campaigns like **Eat Right India and Fit India** should be actively promoted to encourage healthier lifestyles.

➢ **Regulatory Framework Modernization:** A unified healthcare regulatory authority should be established with clear mandates for quality control and standard setting.
- **Mandatory accreditation systems** for all healthcare facilities should be implemented, with regular audits.
- Transparent **pricing mechanisms for medical services and procedures** should be developed.

➢ **One Health Approach**: India should fast track the implementation of the **One Health approach**, which links **human, animal, and environmental health** to prevent zoonotic diseases.
- **Strengthening surveillance** and early detection systems at the human-animal-environment interface can help control outbreaks.
- Collaboration between **healthcare, veterinary, and environmental sectors is essential.**

Conclusion:

To address **India's mounting healthcare challenges,** a multi-pronged approach is essential, focusing on **digital integration, preventive care, and robust public-private partnerships**.Strengthening primary care and **emphasising preventive health will reduce the burden on tertiary systems.** With coordinated reforms, India can better navigate health crises and advance towards universal health coverage and **Sustainable Development Goals (SDGs).**

Charting India's Maritime Future

This editorial is based on "India needs to build ships" which was published in Financial Express on 12/11/2024. India's heavy reliance on foreign vessels for trade, coupled with limited financing options in shipbuilding, poses economic and strategic risks. With major shipbuilding nations controlling the market, India urgently needs policy reforms to strengthen its maritime sector.

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

As India nears its role as the world's third-largest economy, its **minimal share in global shipbuilding (0.07%)** and **ship ownership (1.2%)** exposes strategic and economic risks. Relying on foreign vessels for **95% of trade has led to substantial forex outflows.** The exclusion of ships from the harmonised infrastructure list and the **SARFAESI Act** limits access to competitive financing, stalling growth. With **China, South Korea, and Japan** dominating 93% of global shipbuilding, urgent policy reforms are needed to **align India's maritime sector with its economic aspirations.**

What is the Current Status of India's Maritime Sector?

- **Status:** India ranks as the **16th largest maritime country** globally.
  - The Indian maritime sector **handles 95% of India's trade by volume** and 70% by value.
  - India is the **world's 3rd largest ship recycler by tonnage**, holding a 30% global market share in ship-breaking with the world's largest ship-breaking facility located in Alang.
- Government Initiatives for Maritime Growth
  - **Maritime India Vision 2030**: Launched in **March 2021**, the vision includes over 150 initiatives for the comprehensive development of the Indian maritime sector.
    - Aims to serve as a blueprint for accelerated growth across various facets of India's maritime industry.
  - **Sagar Mala Program (2015):** Focuses on port-led development and logistics-driven industrial growth.
    - Encompasses 415 projects with an investment of $123 billion across four key areas:
      - Port Modernization and New Port Development
      - Port Connectivity Enhancement
      - Port-Linked Industrialization
      - Coastal Community Development
  - Targets include generating **$2.7 billion in annual revenue from existing assets** and **creating 2 million direct and indirect jobs by 2030.**

Why is Investment in Maritime Infrastructure Crucial for India?

- **Economic Security & Trade Resilience**: The recent **Red Sea crisis**, where **Houthi attacks disrupted global shipping routes,** demonstrated India's maritime vulnerabilities, with g**lobal shipping costs surged in the first half of 2024** and forcing vessels to take longer routes around Africa.
  - India's overwhelming dependence on foreign ships (**95% of international cargo**) resulted in freight costs surging to **$75 billion in 2022-23**, with projections exceeding $100 billion soon.
  - As global supply chains face increasing geopolitical pressures, from the **Ukraine war to Middle East tensions**, India's lack of maritime self-reliance **(only 487 vessels for overseas trade)** poses a significant economic risk.
  - Building domestic maritime infrastructure **could save substantial forex outflow** and **provide better control over trade routes.**
- **Strategic Positioning in Indo-Pacific**: India's maritime infrastructure development aligns with its **expanding role in the Indo-Pacific region**, particularly as China increases its presence through initiatives like the "**String of Pearls**" and dominates global shipbuilding with **46.6% market share.**
  - Recent developments like the **India-Middle East-Europe Economic Corridor (IMEC) announcement in 2023**, competing with **China's Maritime Silk Road**, demonstrate the strategic importance of maritime capabilities.
  - Also, India's leadership in initiatives like the **Security and Growth for All in the Region (SAGAR) vision** requires robust maritime infrastructure to be credible.
- **Employment Generation & Skill Development:** India's demographic dividend presents a unique opportunity in maritime infrastructure, especially as **traditional shipbuilding nations face ageing populations.**
  - With India ranking third globally in seafarer supply (contributing **10% of global maritime workforce),** the sector has massive employment potential.
  - Recent initiatives like the **Sagarmala programme have already generated a significant number of jobs,** with projections for millions more through port-led development projects.
- **Environmental Sustainability & Energy Security:** Maritime infrastructure modernization aligns with **India's COP28 commitments and green shipping initiatives.**
  - The **International Maritime Organization's 2023** strategy targeting net-zero emissions by **2050 makes investment in green shipping infrastructure crucial.**
  - India's recent **Harit Sagar Initiative shows** commitment to sustainable maritime infrastructure.
  - The success of projects like **Cochin Shipyard's zero-emission autonomous vessels and Mumbai's electric water taxi system** demonstrates the viability of sustainable maritime solutions.
- **Domestic Manufacturing & Self-Reliance:** Investment in maritime infrastructure supports **India's Atma Nirbhar Bharat initiative** and its goal to become a global manufacturing hub.
  - Recent successes like the **indigenous aircraft carrier INS Vikrant** demonstrate India's shipbuilding capabilities.

- The **PLI scheme's expansion to include marine products** create a foundation for domestic manufacturing growth.

- **Regional Connectivity & Trade Integration:** Maritime infrastructure development enhances India's regional connectivity initiatives like **BIMSTEC** and **IORA**.
  - The successful launch of the **Sittwe Port in Myanmar** and **development of Sabang Port in Indonesia** demonstrate India's growing maritime cooperation.
  - Recent agreements for **maritime connectivity with Maldives and Sri Lanka,** despite political tensions, highlight the importance of sustained maritime infrastructure development.

What are the Major Issues India Faces in Enhancing Maritime Infrastructure?

- **Financing & Infrastructure Status Barriers** The issue of ships not being included in the **harmonised list of infrastructure** (they are not classified as infrastructure) **severely limits financing options,** despite shipyards having infrastructure status since 2016.
  - The exclusion from **SARFAESI Act 2002** makes banks reluctant to provide long-term loans as **ships cannot be mortgaged as securable assets.**
  - Also, In India, financing costs are higher because the **shipbuilding relies heavily on imports of critical raw materials**
  - India currently holds a very small share of the global shipbuilding market at **just 0.06%**, significantly lagging behind the leading countries like **China, South Korea, and Japan,** largely due to these financing constraints.
- **Port Infrastructure & Efficiency Gaps:** Despite handling over **1.4 billion tonnes of cargo in 2022-23,** Indian ports struggle with efficiency metrics well below international standards.
  - The average turnaround time at Indian ports is 2.1 days compared to 0.6 days in Singapore.
  - India's existing major ports have **depth limitations that restrict the accommodation of ultra-large container vessels**, thereby increasing the reliance on transshipment hubs in nearby countries.
- **Skilled Workforce & Infrastructure Constraints:** While India provides 10-12% of global seafarers, there's a significant shortage in **specialized shipbuilding skills.**
  - Also, the Indian maritime sector **lags in adoption of smart port technologies and automation.**
  - The integration of **blockchain, IoT, and AI technologies** in port operations remains at nascent stages.
- **Regulatory & Policy Coordination**: Multiple regulatory bodies and overlapping jurisdictions create operational inefficiencies.
  - Port expansion and maritime infrastructure development face significant challenges in **land acquisition and Coastal Regulation Zone compliance.**
  - The coordination between government agencies involved in the maritime sector leads to delays in project approvals, averaging 2-3 years for major port projects.
  - The **absence of a single-window clearance system, despite announcements in Maritime India Vision 2030**, continues to hinder development.
- **Competition & Market Position:** India faces intense competition from established maritime nations and emerging players.
  - China's dominance in shipbuilding (46.6% global share) and container manufacturing creates significant entry barriers.
  - The **lack of economies of scale,** with Indian shipyards operating at **60-70% capacity utilisation,** further impacts competitiveness.
- **Coastal Shipping Development Lag:** Despite a 7,500 km coastline, coastal shipping accounts for **only 6% of India's domestic freight movement.**
  - Currently, around **30 million tonnes (MT)** of coal is moved on the coastal route from eastern India to south and western India; potential demand is nearly **100 MT by 2030.**
- **Hinterland Connectivity Gaps:** Last-mile connectivity remains a major challenge with only **30% of major ports having direct rail evacuation systems.**
  - The **absence of dedicated freight corridors** connecting major ports to industrial clusters increases logistics costs by 15-20%.
  - Limited development of coastal shipping and **inland waterways infrastructure** restricts **multimodal transportation options.**

What Measures can India Adopt to Accelerate the Development of Maritime Infrastructure?

- **Integrated Port Development Framework:** Establish a unified **National Port Grid Authority** to c**oordinate development across major and minor ports,** eliminating inter-port competition and promoting specialisation.
  - Implement a hub-and-spoke model where 3-4 mega ports (like the **new Vadhavan Port)** act as **transshipment hubs while others serve as feeder ports.**

- Develop **port-specific master plans aligned with regional cargo profiles** and hinterland industrial clusters.
- Link port development with industrial corridors and Special Economic Zones to ensure cargo sustainability.

➢ **Technology-Driven Port Modernization:** Deploy **Smart Port Infrastructure Management Systems (SPIMS)** across all major ports**, starting with JNPT and Mundra as pilot projects**.

- Introduce **blockchain-based Port Community Systems** for paperless trade facilitation, building on the success of **JNPT's recent digitalization.**
- Establish **IoT-enabled cargo tracking** and port equipment monitoring systems.
- Accelerate the development of **National Maritime Single Window like the United Kingdom** integrating **customs, immigration, and port operations.**

➢ **Multimodal Connectivity Enhancement:** Fast-track the completion of pending Dedicated Freight Corridor sections connecting major ports to industrial hubs.

- Develop **coastal economic zones** with integrated logistics parks. Implement a standardised **Port-Rail-Road connectivity** model at all ports, similar to **Gujarat's successful GIFT City model.**
- Create a dedicated port connectivity fund under the **National Infrastructure Pipeline for last-mile projects**.

➢ **Green Port Initiative**: Mandate **solar and wind power integration for all ports**, targeting a fixed percentage of renewable energy usage.

- Implement **shore-to-ship power supply systems** to reduce vessel emissions while berthed.
- Develop **green channel clearances for environmental-friendly port projects**. Install automated environmental monitoring systems at all ports.
- Create dedicated green corridors for cargo movement with **electric vehicle infrastructure.**

➢ **Skill Development and Capacity Building:** Establish Maritime Skill Development Centers at all major ports in partnership with the private sector.

- Create **specialised courses for port automation and smart port operations.** Implement mandatory certification programs for port workers aligned with global standards. D
- Develop **exchange programs with leading international ports for knowledge transfer**. Set up maritime innovation labs at IITs and maritime universities focusing on port technology.

➢ **Private Sector Participation Model**: Redesign **PPP frameworks** with more balanced risk-sharing mechanisms and clear exit options.

- Introduce **hybrid annuity model for port projects** similar to successful highway projects.
- Create **special purpose vehicles for port-led development** with equity participation from states and private sector.
- Establish **port infrastructure investment trusts (InvITs**) to attract long-term capital.

➢ **Coastal Community Integration:** Develop **fishing harbours and coastal tourism** infrastructure alongside commercial port development.

- Create **skill development programs** specifically for coastal communities in port-related activities.
- Implement **comprehensive rehabilitation packages for project-affected persons** with long-term livelihood support.
- Establish **community-managed minor ports for local trade and fishing activities.**

➢ **Port Efficiency Enhancement Program:** Implement port performance benchmarking system with real-time monitoring and rewards.

- Develop **specialised cargo handling facilities based on port-specific cargo profile.**
- Create dedicated coastal berths at all major ports to promote coastal shipping. Establish **port-based free trade warehousing zones** to reduce logistics costs.

Conclusion:

Strengthening India's maritime infrastructure is **pivotal for enhancing trade resilience, fostering economic growth,** and bolstering strategic security in alignment with its economic aspirations. Through targeted policy reforms and investment, India can reduce its reliance on foreign vessels, promote sustainable practices **(SDG 9: Industry, Innovation, and Infrastructure).** Also, developing a robust maritime sector will not only support domestic manufacturing but also enhance **environmental sustainability (SDG 13: Climate Action) for future generations.**

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Ethanol Blending: A Path to Energy Security

This editorial is based on "Ethanol blending is proving messy" which was published in The Hindu Business Line on 10/11/2024. The article highlights the challenges

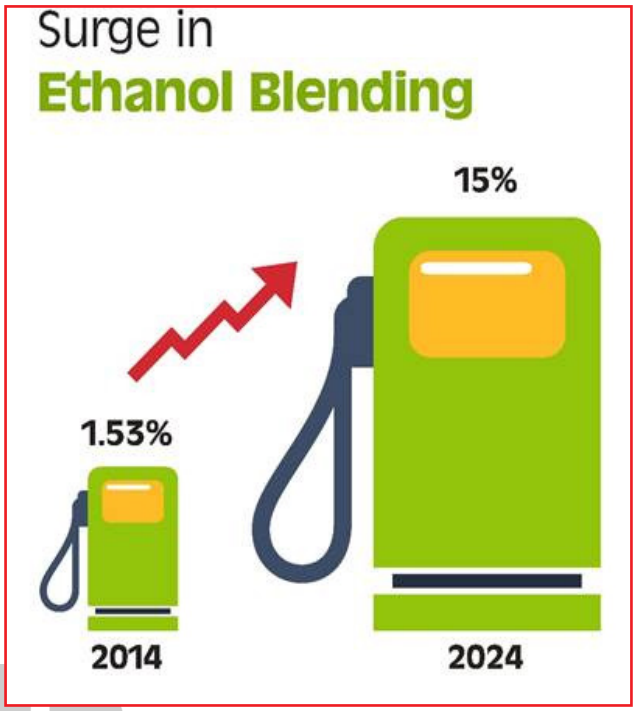
India faces in its 90% flex-fuel vehicle push, including food security concerns, policy strain, and climate impacts, stressing the need for a thorough cost-benefit analysis.

Tag: S Tag: GS Paper - 3, Environmental Pollution & Degradation, Renewable Energy, 2nd ARC

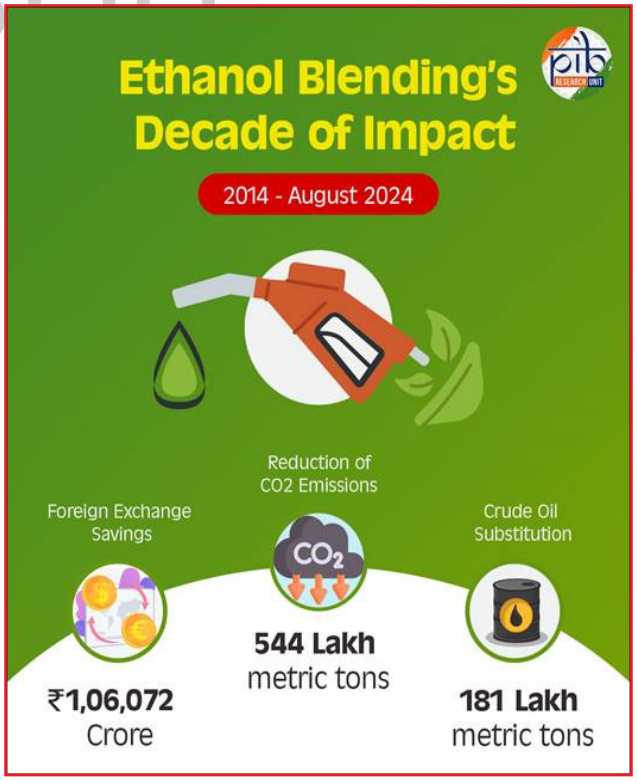
India's push for **90% flex-fuel vehicles,** inspired by **Brazil**, faces significant challenges despite achieving **15% ethanol blending in 2024**. While the **Ethanol Blending Programme** has saved ₹1.01 lakh crore in forex, diverting food crops like **sugarcane, rice, and maize for ethanol** raises concerns over food security. The program relies on constant policy adjustments, unlike **Brazil's market-driven model,** straining both OMCs and government finances. Climate change and unpredictable monsoons further complicate blending targets, underscoring the need for a comprehensive cost-benefit analysis before scaling up flex-fuel adoption.

What is the Current Status of Ethanol Blending in India?

- **About**: Ethanol is a type of **alcohol primarily produced from the fermentation of sugars**, often derived from crops like sugarcane, maize, or other biomass.
  - It is commonly used as a biofuel, solvent, and in various industrial applications.
  - **Ethanol Blending** refers to the practice of mixing ethanol with petrol to create an ethanol-blended fuel.
    - This **reduces the consumption of pure petrol,** decreases environmental pollution, and promotes the use of domestically produced biofuels, contributing to energy security and sustainability.
  - India, as the **world's third-largest energy consumer,** has turned to ethanol blending to reduce oil imports. Reforms in the **Ethanol Blended Petrol (EBP) Programme,** enhance energy security and support rural incomes.
    - India has reduced the GST on ethanol to **5%** and introduced an **interest subvention** scheme to boost production capacity.
- Progress of Ethanol Blending in India:
  - **Initial Target**: 20% ethanol blending by 2030, later advanced to 2025.
  - **Production Growth:** Ethanol production capacity has **more than doubled, reaching 1,623 crore liters by September 2024.**



  - **Blending Increase**: Blending surged from **1.53% in 2014 to 15% in 2024**, with over 545 crore liters blended in 2023-24.
- **Achievements**: India's Ethanol Blended Petrol (EBP) Programme achieved remarkable progress, with blending increasing from **1.53% in 2014 to 15% in 2024**, targeting 20% by 2025.
  - This initiative saved **₹1.06 lakh crore in forex, cut CO_2 emissions by 544 lakh metric tons,** and boosted rural income significantly



Why Ethanol Blending is Crucial for India's Energy Transition?

- **Energy Security and Import Dependency**: India currently imports over **85% of its crude oil requirements,** making it vulnerable to global price volatility and geopolitical tensions.
  - The **recent Russia-Ukraine conflict and West Asian tensions** have highlighted this vulnerability, with oil prices fluctuating dramatically.
  - The ethanol blending program has already saved **₹1.06 lakh crore in foreign exchange** through reduced imports.
  - By achieving **15% blending in 2024**, India has demonstrated the program's potential to significantly reduce import dependency. With the 20% target by 2025, India could potentially save billions annually in forex reserves.
- **Economic Benefits for Agricultural Sector**: The EBP has created a sustainable revenue model for farmers and sugar mills, with **Oil marketing companies (OMCs)** paying **₹87,558 crore directly to farmers and ₹1.45 lakh crore to distillers.**
  - This additional income stream has helped address the chronic problem of sugarcane arrears, which had historically plagued the agricultural sector.
  - The program has stimulated private investment, with distillers establishing ethanol capacities of **16.2 billion litres by September 2024.**
  - The multiplier effect has boosted rural economies and created new employment opportunities in the biofuel sector.
- **Environmental Impact and Climate Commitments:** Ethanol blending significantly reduces vehicle emissions, with studies showing a **20% reduction in carbon monoxide emissions with E20 fuel.**
  - India's commitment at **COP26 to reduce carbon intensity by 45% by 2030** makes ethanol blending a crucial tool in achieving climate goals.
  - Recent data shows that ethanol blending has already resulted in an estimated **reduction of CO2 emissions by 544 lakh metric tons.**
  - The program aligns with **India's broader renewable energy transition strategy,** complementing solar and wind initiatives.
- **Technological Innovation and Industrial Growth**: The push for ethanol blending has catalyzed **innovation in automobile technology**, with major manufacturers developing **flex-fuel engines.**
  - The **recent announcement of flex-fuel vehicles getting GST concessions** has accelerated R&D investments in this sector.
  - The program has spurred growth in biotechnology and chemical processing industries, with **new second-generation ethanol plants being established.**
  - The development of **grain-based distilleries** has created a new industrial ecosystem, generating employment and technological advancement.
  - The recent approval of **using rice straw and corn cobs for second-generation ethanol production addresses stubble burning issues.**
- **Strategic Geopolitical Positioning:** India's ethanol program strengthens its position in global climate negotiations and enhances cooperation with Brazil and other biofuel-producing nations.
  - The recent **Global Biofuel Alliance signed in 2023** facilitates technology transfer and expertise sharing.
  - The program demonstrates **India's commitment to sustainable development,** attracting green investments and international partnerships.
  - India's leadership in biofuel adoption positions it as a **model for developing nations in energy transition.**
- **Market Development and Price Stability:** The establishment of a guaranteed ethanol market has **created price stability in the sugar sector**, historically known for volatility.
  - The program has created a predictable demand curve for agricultural produce, helping in better crop planning.
  - The **fixed pricing mechanism**, while different from Brazil's model, provides certainty for investments in the sector.

What are the Key Issues Associated with Ethanol Blending for India?

- **Food Security vs. Fuel Production Conflict**: Government recently lifted cap on sugar diversion for ethanol production starting in November 2024.
  - The December 2023 government directive **halting cane juice diversion to ethanol highlights the precarious balance**
  - The country's net sugar consumption might touch an unprecedented **30 million tonnes** in the 2024-25 season and more diversion is expected towards ethanol.
  - This **food-fuel conflict becomes more acute during poor monsoon years**, raising questions about the program's sustainability.
- **Water Resource Strain:** Sugarcane, the primary ethanol feedstock, requires approximately **2,500 litres of water per kilogram of sugar produced**.

- The increased cultivation for ethanol has led to severe groundwater depletion in major producing states like **Maharashtra and Uttar Pradesh.**
- Recent studies have reported that the life cycle water footprint for ethanol production in India is betwee**n 230-7150 litres of water per litre of ethanol** depending on the residue and processing technology, adding to the strain on water resources.

➢ **Economic Viability and Price Mechanisms:** Unlike **Brazil's market-driven model,** India's administered pricing mechanism for ethanol creates artificial economics.
- The recent increase in procurement prices from **₹43-59 to ₹49-66 per liter (FY19-FY23)** strains OMCs' finances.
- The differential pricing for **various feedstocks (sugarcane juice, B-heavy molasses, grains)** creates market distortions.

➢ **Impact on Alternative Food Industries:** The diversion of **maize to ethanol has severely impacted the poultry and animal feed sectors,** with prices rising by 20%.
- Recent demands for **duty-free maize imports from the poultry industry** highlight the supply chain disruption.
- The **starch industry,** using **maize** as raw material, reports production cuts due to feedstock shortages.
- The projected diversion of maize annually threatens India's position as a net maize exporter.
  - India typically exports between **2 to 4 million metric tonnes of corn annually.** However, in 2024, exports are projected to plummet to just **450,000 tonnes,** while the country is set to import a record **1 million tonnes, primarily from Myanmar and Ukraine.**

➢ **Environmental Trade-offs:** While ethanol reduces vehicle emissions, the **entire lifecycle assessment shows complex environmental impacts.**
- Recent studies indicate **increased water pollution from distillery discharge despite zero liquid discharge norms.**
- The **carbon footprint of ethanol production**, including land-use changes and transportation, partially offsets emission benefits.
  - Recent studies show that **life cycle GHG emissions of ethanol production were found to be 123.10 kg CO2-eq/kg** of anhydrous ethanol.
  - The main source of GHG emission was the **electricity used in the process stage (97.83%).**
- Also, intensive sugarcane cultivation leads to **soil degradation and affects biodiversity in agricultural regions.**

➢ **Technological and Vehicle Compatibility:** The existing vehicle fleet requires significant modifications for higher ethanol blends beyond E20.
- Current vehicles that are not specifically designed for E20 fuel can face issues like **increased corrosion of engine components,** potential damage to rubber seals and gaskets due to ethanol's corrosive nature, decreased fuel efficiency
- **Consumer acceptance remains uncertain given the lower energy content** of ethanol-blended fuels.

What Steps can India take to Boost Ethanol Blending?

➢ **Diversification of Feedstock Sources**: Implement a comprehensive policy to promote **second-generation (2G) ethanol production** using agricultural residues and waste materials.
- Establish collection centres for crop residues with automated baling and storage facilities at block levels, **similar to palletisation units in Punjab.**
- Incentivize farmers with **direct payments for crop residue collection**.
- Create public-private partnerships for establishing 2G ethanol plants, with the current successful example of **Panipat's paddy straw plant producing 100 kiloliters daily**.

➢ **Storage and Infrastructure Development**: Create a **dedicated ethanol pipeline network connecting major production clusters to consumption centers**, starting with high-priority corridors.
- Establish regional ethanol storage hubs with modern facilities including **anti-corrosion technologies and safety measures.**
- Develop specialized **railway wagons for ethanol transport.** Create emergency storage facilities to manage seasonal supply fluctuations.

➢ **Technology and Research Support**: Establish dedicated ethanol research centers in agricultural universities focusing on **developing high-yield, drought-resistant crops specifically for ethanol production.**
- Invest in **developing enzymes and fermentation technologies** suited to Indian feedstock varieties and climatic conditions.
- Support **automobile manufacturers in developing cost-effective flex-fuel technologies** through research grants and tax incentives.

- **Price Mechanism Reform:** Implement a dynamic pricing mechanism **linked to international crude oil prices and domestic feedstock costs.**
  - Create a **transparent formula-based pricing system** reviewed quarterly to ensure producer viability and consumer affordability.
  - Establish a **price stabilization fund to manage volatility**, funded through a small cess on petroleum products.
- **Supply Chain Optimization**: Create an **integrated digital platform for real-time tracking of ethanol movement** from distilleries to blending centers.
  - Establish **zonal storage and distribution hubs** to optimize transportation costs and reduce carbon footprint.
  - Implement **smart logistics solutions using AI/ML for demand prediction** and inventory management.
  - Develop specialized ethanol handling facilities at ports for export potential. Create emergency response mechanisms for supply disruptions.
- **Regulatory Framework Enhancement:** Establish a **single-window clearance system for ethanol projects** under a dedicated regulatory authority.
  - Streamline environmental clearance processes while **maintaining strict compliance standards**.
  - Create standardized quality control protocols for ethanol production and blending across the country.
- **Sustainable Agricultural Practices**: Promote **crop rotation and intercropping systems** that support ethanol feedstock production without compromising food security.
  - Implement **precision farming techniques** for sugarcane cultivation to improve water use efficiency.
  - Develop **micro-irrigation systems specifically designed for ethanol feedstock crops.**
  - Create farmer producer organizations focused on sustainable feedstock production.
- **Capacity Building and Skill Development:** Establish specialized training centers for ethanol plant operators and maintenance personnel.
  - Create **certification programs for ethanol handling** and safety procedures.
  - Develop vocational courses in agricultural colleges focused on biofuel feedstock management.
- **International Cooperation:** Strengthen technical collaboration with countries like **Brazil and USA for technology transfer and best practices.**
  - Develop joint research programs with international institutions on advanced biofuel technologies.
  - Create bilateral agreements with Brazil for **knowledge exchange on flex-fuel vehicle technology.**
    - **Biofuels are part of Brazil's National Energy Plan** which helps set direction for energy supply and demand across the country. **India can significantly learn from this.**
- **Environmental Monitoring and Management:** Implement real-time monitoring systems for environmental impacts of ethanol production.
  - Develop **water recycling and zero liquid discharge systems** for distilleries with incentive mechanisms.
  - Establish **carbon credit mechanisms** for ethanol producers meeting sustainability criteria.

Conclusion:

India's **ethanol blending program**, while promising, faces challenges in **balancing food security, environmental sustainability, and economic viability**. A comprehensive approach involving feedstock diversification, technological advancements, and policy reforms is crucial to ensure the program's long-term success. India's journey towards a sustainable and energy-secure future hinges on a well-calibrated ethanol blending strategy.

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Revitalizing India's Local Governance

This editorial is based on "Modest means: Time to strengthen and reimagine India's local bodies" which was published in Business Standard on 14/11/2024. The article brings into picture the challenges faced by municipal corporations, which generate 60% of India's GDP but receive only 0.6% in revenue. It emphasizes the need for greater fiscal powers and autonomy to ensure effective local governance and accountability.

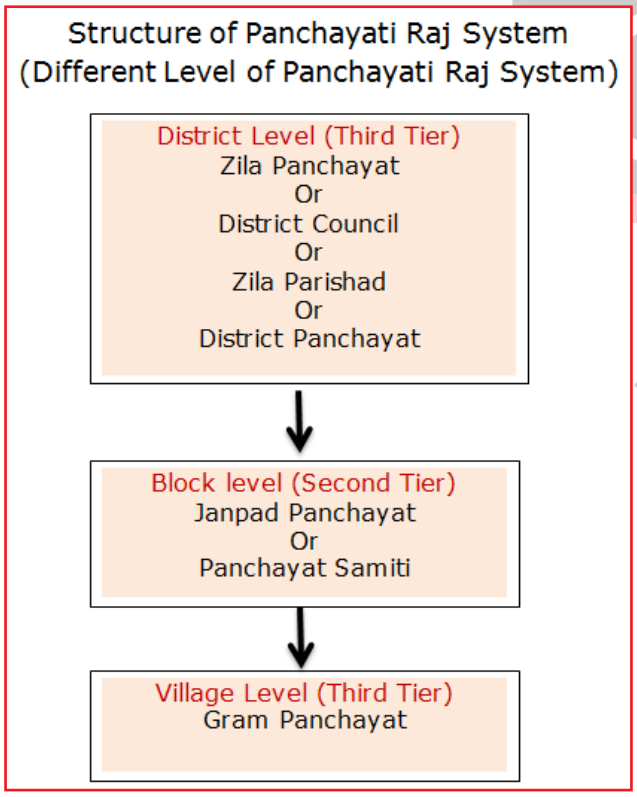
Tag: GS Paper - 2, Separation of Powers, Local Self Governance

The **RBI's report on municipal corporation finances** underscores a critical urbanization challenge: **despite generating 60% of India's GDP** and **housing half the population by 2050,** municipal corporations command only **0.6% of GDP in revenue receipts.** They rely heavily on grants and underutilize revenue sources like **property tax.** Notably, **10 municipal corporations account for 60% of revenues,** highlighting resource disparities. Without full devolution of the **3Fs (Functions, Finances,**

Functionaries), grassroots governance remains weak. Strengthening fiscal powers and autonomy is essential for better local governance and accountability.

What is the Current Structure of Local Governance in India?

- **About:** Local bodies are **institutions of self-governance** responsible for planning, development, and administration in **rural (Panchayats) and urban (Municipalities)** areas.
  - They play a critical role as **regulators, service providers, welfare agents, and facilitators** of development at the grassroots level.
- **Constitutional Framework:** Local government is a **State subject** under the **Seventh Schedule (List II) of the Constitution**.
  - **Article 243G** provides for the devolution of powers to local bodies, making them key players in delivering infrastructure and services.
- **Evolution of Local Bodies:**



  - Originated during British rule, Panchayati Raj was envisioned by Mahatma Gandhi as **"Gram Swaraj" (village self-governance).**
  - Early efforts like the **1952 Community Development Programme** failed due to lack of public participation.
  - **Balwantrai Mehta's 1957** report advocated village-level organizations for implementing government schemes.
  - The **Ashok Mehta Committee (1977)** emphasized empowering Panchayats, leading to **"Second Generation Panchayats."**
  - The **73rd Constitutional Amendment (1992)** institutionalized Panchayati Raj as the third tier of governance, granting powers for economic and social development planning over 29 subjects listed in the Eleventh Schedule.
- Funding Sources for Panchayats:
  - Local body grants recommended by the **Central Finance Commission.**
  - Funds from **centrally-sponsored schemes.**
  - State government allocations via **State Finance Commissions.**

What Role do Local Bodies Play in Strengthening Development in India?

- **Financial Decentralization and Resource Management:** The **15th Finance Commission** has allocated **Rs 4.36 lakh crore to local bodies for 2021-26**, marking a significant increase in their financial autonomy.
  - Municipal corporations are **increasingly exploring innovative financing methods,** with **Indore Municipal Corporation raising Rs 244 crore** through green bonds in 2022 for solar projects.
  - Property tax reforms, like **Bengaluru's GIS-based system implemented in 2023,** have shown potential to increase revenue.
- **Urban Planning and Infrastructure Development:** Local bodies are spearheading transformation through initiatives like the **Smart Cities Mission,** with **100 cities** implementing projects worth Rs 2.05 lakh crore.
  - Municipalities are adopting climate-resilient infrastructure planning, exemplified by **Surat's flood management system**.
  - Innovative projects like **Indore's waste-to-energy plant**, showcase local bodies' capacity for sustainable development.
- **Social Welfare and Public Service Delivery:** Gram panchayats have played a crucial role in **MGNREGA implementation,** generating a total of 293.70 crore person days in FY 2022-23.
  - Local bodies' involvement in health infrastructure proved vital during **Covid-19,** with urban local bodies managing vaccination centers.
  - The convergence of schemes like **National Rural Livelihood Mission through panchayats** has helped form more than **90 lakh Self Help Groups.**

- **Environmental Sustainability and Climate Action**: Urban local bodies are leading climate action through initiatives like **India's first solar city Diu achieving 100% daytime solar power**.
  - Municipalities are increasingly adopting **green building codes,** with **Hyderabad mandating rainwater harvesting** in new constructions.
- **Participatory Democracy and Citizen Engagement:** The 50% reservation for women in local bodies has enhanced women representation at grassroot level.
  - Elected women representatives constitute **45.6% of total Panchayati Raj Institution representatives. (RBI report**)
  - **Participatory budgeting initiatives, like in Pune,** are strengthening democratic processes.
  - The **Area Sabha system, implemented in cities like Chenna**i, has created neighborhood-level democratic units.
  - Gram Sabhas have achieved **85% attendance in key decisions**.
- **Economic Development and Livelihood Generation:** Through the PM SVANidhi scheme, municipalities have facilitated **more than 65.75 lakh loans, benefiting over 50 lakh street vendors.**
  - **Common Services Centers (CSC)** has launched the **Yogyata mobile phone application** to provide vocational educational and skill enhancement opportunities to youth.

What are the Major Challenges Confronting Local Bodies in India?

- **Inadequate Financial Resources:** Local bodies lack financial independence, relying heavily on state and central transfers, which are often delayed or conditional.
  - According to the RBI's 2022 report, **urban local bodies (ULBs) generated only 0.6% of GDP** as their own-source revenue (OSR), far below Brazil's 7%.
  - Limited capacity to **levy and collect taxes further exacerbates the issue**
  - The **15th Finance Commission granted ₹4.36 lakh crore** to local bodies for **2021-26,** but timely utilization remains a concern.
  - Also**, State Finance Commissions** are not established in a timely manner. This delay hinders the effective distribution of resources and proper fiscal planning at the state level.
- **Functional Challenges and Political Interference:** Frequent political interference undermines the functioning of local bodies, disrupting their autonomy and accountability.
  - State governments often **dissolve elected councils prematurely or delay local elections,** as seen in **Maharashtra**, where all 27 municipal corporations operated without elected bodies in 2023.
  - Additionally, party politics influence local decision-making, sidelining public welfare.
  - Karnataka's government notice of dismissal to **Belagavi Municipal Corporation** in 2023 highlights this interference.
    - Such actions not only weaken local democracy but also **delay critical urban reforms like waste management.**
- **Capacity Building and Human Resource Deficiency:** Local bodies suffer from severe **understaffing, lack of technical expertise, and inadequate training of existing staff**.
  - This affects their ability to plan, implement projects, and utilize modern technology for governance. The absence of specialized departments hampers efficient service delivery.
  - A 2023 study found that municipal corporations have **35% vacant positions**.
- **Urbanization and Infrastructure Stress:** Rapid urbanization has overwhelmed local bodies, straining their ability to provide essential services like housing, water, and sanitation.
  - Slum households constitute **17% of the total urban population**. At the same time, there are 11 million vacant homes across urban India. **(Observer Research Foundation)**
  - In Bengaluru, the **2022 floods exposed the failure of urban local bodies** to manage encroachments on drainage channels.
  - Similarly, slums in Mumbai face chronic water shortages, reflecting poor urban planning. Without proactive planning, local bodies struggle to meet the needs of rapidly growing populations.
- **Environmental Management Challenges:** Managing waste and pollution remains a critical challenge for local bodies, with significant gaps in compliance and infrastructure.
  - The **Ministry of Environment, Forest and Climate Change** estimates that only **75–80% of the total municipal waste** gets collected and **only 22–28%** of this is processed and treated, and landfill sites like **Ghazipur in Delhi continue to grow.**
  - Poor waste management also exacerbates air pollution; for instance, **stubble burning in Punjab and Haryana** persists due to weak enforcement at the local level.

- **Community Participation and Accountability:** Despite constitutional provisions, community participation in governance remains minimal, weakening local accountability.
  - A recent study states that as of January 2023, **only 8 of 16 states with notified ward committee rules** reported active committees.
  - Local bodies often fail to utilize mechanisms like **Gram Sabhas effectively (partially due to reduced powers under Biological Diversity (Amendment) Act, 2023),** resulting in top-down decision-making.
- **Coordination with Multiple Agencies**: Local bodies often struggle with overlapping jurisdictions and poor coordination with **parastatal agencies or Special Purpose Vehicles.**
  - Multiple authorities handling similar functions leads to inefficiency and delays in project implementation. Planning becomes complicated due to a fragmented institutional framework.
  - For instance, the **Delhi Development Authority (DDA) and Municipal Corporation of Delhi (MCD**) often face coordination issues when it comes to urban planning, land acquisition, and infrastructure projects.

What Measures can be Adopted to Empower Local Bodies in India?

- **Legal Framework Strengthening:** State municipal legislations need comprehensive revision to empower local bodies with greater autonomy and authority.
  - Following **L M Singhvi Committee recommendations**, dedicated tribunals should be established to handle local body disputes quickly.
  - Clear **delineation of functions between state and local bodies** needs legal backing through detailed activity mapping.
  - Enforcement powers of local bodies need strengthening especially in areas of **planning violations and revenue collection.**
  - Legal frameworks for **municipal borrowing and alternative financing** need establishment.
- **Financial Empowerment:** A comprehensive **municipal finance management system** must be established with **digital integration and modern property tax reform**s using GIS and market-linked rates.
  - Developing municipal bond markets and enabling direct market borrowing with credit rating mechanisms can create new funding channels.
  - **L M Singhvi Committee's recommendation** for stronger financial powers should be implemented through **state finance commissions and regular fiscal devolution**.
  - Local bodies should be empowered to **generate their own revenue through diverse sources like betterment levy, impact fees, and land monetization.**
  - **Kerala's decentralization model** successfully incorporates Panchayati Raj Institutions (PRIs) into state-level planning, ensuring grassroots participation in governance, can be replicated in other states too.
- **Administrative Reforms**: Following **GVK Rao Committee's** emphasis on **professionalization,** a specialized urban administrative service cadre should be established with permanent technical staffing including urban planners and specialists.
  - **Performance-based staff assessment and promotion systems** need implementation to ensure accountability and efficiency.
  - **Regular capacity building and training programs** should be mandated for all levels of staff through dedicated institutions.
  - E-governance platforms should **streamline administrative processes while enabling transparency and reducing corruption.**
- **Planning Authority Enhancement:** Local bodies need **planning autonomy within state guidelines,** with mandatory long-term master plans that undergo regular updates.
  - Strengthening **Metropolitan Planning Committees** with real powers will enable coordinated regional development.
  - Integration of **ward-level plans into city development plans** ensures bottom-up planning aligned with **Balwant Rai Mehta Committee's vision.**
  - Dedicated **planning cells in each municipality staffed with professional planners** will enhance planning quality and implementation.
- **Technology Integration:** Comprehensive digital platforms should integrate all municipal services with **real-time monitoring systems for service delivery and revenue collection.**
  - Smart infrastructure management solutions including **IoT sensors and automated systems** should be implemented for efficient asset management
  - Digital payment and collection systems need universal implementation to improve financial efficiency and transparency.

- **SwachhAI** should be implemented in a steadfast manner.

❍ Citizen engagement platforms with grievance redressal mechanisms should be mandatory.

➢ **Participatory Governance**: Ward committees need strengthening with real powers and budgets, implementing **L M Singhvi Committee's vision of grassroots democracy.**

❍ Participatory budgeting mechanisms should be **mandatory with fixed percentage** allocation for ward-level decisions along with using **blockchain technology for transparent budgeting.**

❍ Citizen monitoring of projects through digital platforms and **social audits needs to be institutionalized**. Regular ward sabhas and area sabhas should be mandated with online streaming for transparency.

➢ **Environmental Management**: Mandatory **climate action plans for all urban local bodies** need to be backed by dedicated funding and implementation mechanisms.

❍ Integrated **waste management systems with waste-to-energy conversion** should be standardized across cities.

❍ Environmental monitoring cells with **real-time air quality data and pollution control** measures need establishment.

❍ Green infrastructure development **including urban forests and water conservation should be mandatory.** Sustainable urban planning guidelines need to be integrated into all development plans.

Conclusion:

Strengthening **India's local governance requires enhanced fiscal autonomy, administrative reforms, and robust legal frameworks** to empower local bodies. Empowering local bodies through **democratic decentralization will drive effective urban and rural development.** Active citizen participation and technology integration can foster greater transparency and accountability.

■■■

Transforming Governance with AI and DPI

This editorial is based on "It's time for the age of GovAI — reimagining governance with AI" which was published in The India Express on 18/11/2024. The article highlights how India's digital transformation, fueled by initiatives like Digital Public Infrastructure (DPI) and GovAI, is reshaping governance by utilizing AI to boost efficiency, increase public impact, and create a more citizen-focused system. With extensive data resources and a rapidly growing digital landscape, India is set to lead globally in AI-driven governance.

Tag: GS Paper - 2, E-Governance, Government Policies & Interventions, Transparency & Accountability, GS Paper - 3, Inclusive Growth, Artificial Intelligence.

The past decade has transformed India into a global leader in **technology-driven governance**, marked by its rise as the **fifth-largest economy** and a pioneer in **Digital Public Infrastructure (DPI)**. Governance has evolved into a system that directly serves citizens, ensuring **efficiency**, **transparency**, and **impact**. With **90 crore Indians connected to the internet** and generating **massive datasets**, the integration of **Artificial Intelligence (AI)** into **DPI** holds immense potential to reimagine governance.

What is AI and Its Applications in Leveraging DPI?

➢ **Artificial Intelligence (AI)**: **Artificial Intelligence (AI)** refers to systems capable of mimicking human cognitive processes, such as learning, reasoning, and decision-making.

❍ These capabilities are powered by advanced **algorithms**, **data analysis**, and **pattern recognition**.

➢ **Enhancing Indian DPI:** In India, **AI-enabled DPI platforms** like **Aadhaar, UPI, and DigiLocker** have revolutionized governance.

❍ These platforms integrate **multilingual AI systems**, ensuring accessibility for India's diverse population.

❍ AI also supports **predictive analytics** for better planning and **real-time engagement** with citizens, making governance more inclusive.

➢ **GovAI is Revolutionizing Governance: GovAI**, or **AI in governance**, ensures **efficiency**, **transparency**, and **citizen-centric service delivery**.

❍ It streamlines **revenue collection**, monitors **social security schemes**, and optimizes **disaster management**.

❍ For example, **AI in public revenue management** identifies **tax evasion** patterns while ensuring faster compliance processes.

➢ **Transforming Industries**: AI drives **automation**, improves **precision**, and enhances **efficiency** across industries.

- In **healthcare**, AI tools predict diseases and personalize treatments. In **agriculture**, AI offers predictive insights into crop health and weather patterns.
- Similarly, **education** and **transportation** benefit from AI-driven innovations that improve accessibility and service delivery.

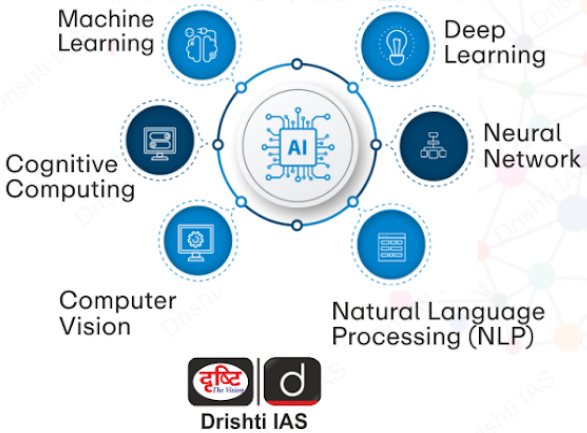
Artificial Intelligence(AI)

AI is the simulation of human intelligence in machines programmed to think and learn like humans, capable of problem-solving, reasoning, and adapting to new information.

AI Timeline - Major Milestones

- **1950s** – Turing Test Proposed; First AI Programs Developed
- **1956** – Dartmouth Conference Coins "Artificial Intelligence"
- **1960s** – Eliza Chatbot Created; Early Neural Networks Emerge
- **1996** – Deep Blue - a Chess-Playing Program
- **2012** – Deep Learning Breakthrough in Image Recognition
- **2014** – Generative Adversarial Networks (GANs) Introduced
- **2020** – GPT-3 Demonstrates Advanced Language Generation
- **2022** – Chatgpt Launches, Bringing Conversational AI to Masses
- **2023** – Generative AI Boom; Major Tech Companies Release AI Models

KEY COMPONENTS OF AI



Applications of AI

- **Healthcare:** Personalised medicine
- **Finance:** Algorithmic trading
- **Transportation:** Autonomous vehicles
- **Marketing & Customer Service:** Targeted advertising, chatbots
- **Education:** Adaptive learning systems, personalised tutoring
- **Agriculture:** Crop monitoring
- **Cybersecurity:** Threat detection
- **Energy:** Smart grid management, consumption forecasting

Concerns

- Deepfakes & misinformation
- Algorithmic bias
- Automation & job displacement
- Privacy issues
- Data ownership & liability issue
- Ethical decision-making complexes

Regulating AI

- **Global Partnership on AI (GPAI)** launched in 2020
- **Bletchley Declaration (2023):** Enhance Global Collaboration on AI
- **G20 New Delhi Leaders' Declaration (2023):** Harnessing AI responsibly for good and for all
- **Hiroshima AI Process (2023)** by G7

India and AI

- **National Strategy For AI 2018**
- **AI For All:** Self-learning online program
- **GPAI Summit 2023** hosted by India
- **IndiaAI Mission 2024**
- **US India Artificial Intelligence (USIAI) Initiative:** AI cooperation in critical areas
- **AIRAWAT** (AI Research, Analytics and Knowledge Assimilation Platform): Supercomputer

Drishti IAS

What is Digital Public Infrastructure (DPI)?

- **About: DPI** refers to foundational digital platforms, such as **digital identification systems**, **payment infrastructures**, and **data exchange solutions**, designed to deliver essential services. These systems promote **digital inclusion**, empowering citizens and enhancing their quality of life by enabling access to critical services.
- **Components of the DPI Ecosystem:** DPIs facilitate the flow of **people**, **money**, and **information**, forming the basis of an effective ecosystem:
  - **Digital Identification Systems** ensure seamless flow of people by providing verified digital IDs.
  - **Real-Time Payment Systems** enable fast, efficient, and secure money transfers.
  - **Consent-Based Data Sharing Systems** empower individuals to control their personal information, unlocking the full benefits of DPIs while ensuring **data security** and **privacy**.

What Role Can AI Play in Transforming Governance?

- **Improving Public Service Delivery:** AI automates routine tasks, reducing inefficiencies and **human errors**.
  - For example, platforms like **DigiLocker** streamline credentialing, while **chatbots powered by AI** offer real-time citizen support.
  - This has enhanced citizen engagement, especially in remote areas, ensuring government services are accessible to all.
- **Data-Driven Policy Making:** AI enables **evidence-based policymaking** by analyzing large datasets to identify trends and predict outcomes.
  - For instance, the **National Data and Analytics Platform (NDAP)** can enhance AI-driven governance by providing accessible, high-quality public sector data.
  - This data can fuel AI models for **predictive analytics**, **evidence-based policymaking**, and **improved public service delivery**, enabling more transparent, efficient, and data-driven decision-making across government sectors.
- **AI Powers Inclusive & Multilingual Governance:** **Large Language Models (LLMs)** and **multilingual AI systems** enable citizens to access services in **regional languages**, breaking linguistic barriers.
  - This ensures **inclusivity in governance**, empowering marginalized communities. For instance, integrating AI into DPI ensures that platforms like **CoWIN** address diverse linguistic needs.
- **Groundbreaking Innovations in Healthcare:** AI in healthcare is revolutionizing delivery and accessibility by enabling **telemedicine** platforms that provide **personalized healthcare** services to even the most remote areas.
  - Recently , the **National Health Authority (NHA)** and **IIT Kanpur** have signed an MoU under the **Ayushman Bharat Digital Mission** to advance AI in healthcare.
  - This collaboration aims to develop a **digital public goods platform** for AI-driven health research, enabling the comparison and validation of AI models
- **AI Drives Agricultural & Rural Development:** AI offers predictive insights for **weather patterns**, **pest management**, and **resource allocation**, benefiting farmers. Example: AI startup Fasal provides a 14-day micro-climatic forecast advance to prepare in advance for inconsistent weather..
  - It supports **precision farming** by optimizing inputs such as water and fertilizers, while bridging the urban-rural divide in technology access.
  - For instance, to optimize the crop cutting experiment for the **Pradhan Mantri Fasal Bima Yojana** project, the central government utilized an **AI** and **Machine learning (ML)**-driven digital platform from **CropIn**.
- **AI Enhances National Security & Disaster Management:** AI's **real-time analytics** enhance **cybersecurity** and **national security** by **predicting threats**, **monitoring data**, and **analyzing intelligence**, ensuring **faster response times**.
  - AI is transforming flood management in India by enhancing **prediction**, **response**, and **prevention** through technologies like the **RAHAT app** in Assam, which facilitates **early warning**, **evacuation**, **search and rescue**, and **resource distribution**, particularly in **remote areas**.
- **Economic Growth Is Accelerated by AI:** India's **startup ecosystem** has rapidly expanded, now home to over **100,000 startups**, with many focusing on cutting-edge **AI innovations**.
  - The **INDIAai Innovation Centre** plays a crucial role in nurturing these startups by providing resources, training, and a platform for developing **AI models** specifically designed for **governance** and **public sector challenges**.
  - Through **public-private partnerships**, the government enhances this innovation by offering **funding**, **infrastructure**, and **collaborative support**, accelerating the development and deployment of AI solutions across various sectors.

- **India's AI Leadership:** As Chair of the **Global Partnership on Artificial Intelligence (GPAI)**, India promotes **responsible AI governance**.
  - Through initiatives like **INDIAai**, the country fosters an ecosystem that is **scalable**, **ethical**, and **inclusive**, serving as a model for global AI implementation.

What are the Challenges in AI Integration in Governance?

- **Data Fragmentation:** India's **fragmented** and **inconsistent datasets** pose major challenges to **AI effectiveness**, as **high-quality, standardized data** is essential for AI systems to **learn**, **adapt**, and make **accurate predictions**.
  - However, in India, **data is often siloed** across different government departments, agencies, and private entities, leading to duplication, gaps, and inconsistencies.
  - The **lack of unified and structured datasets** hinders **AI efficiency**, reducing **accuracy** and **reliability**, while also raising **privacy concerns** as **fragmented data** may lack sufficient **security** and **safeguards against misuse**.
- **Infrastructure Gaps & Limited Scalability: Robust computational infrastructure** is essential for effective **AI deployment**, but despite efforts like **INDIAai Compute Capacity**, **rural** and **underserved regions** still face challenges with **limited internet connectivity**, **data storage**, and **computing resources**.
  - While urban centers benefit from advanced AI capabilities, rural areas struggle with basic infrastructure, creating a **digital divide** that excludes large populations from AI-enabled governance.
  - Also, AI systems require **constant power and connectivity**, which are often unreliable in rural areas, further limiting their scalability.
  - Building and maintaining AI infrastructure, such as **data centers** and **supercomputers**, is **capital-intensive** and demands long-term investments.
- **Regulatory Frameworks:** India currently lacks a **comprehensive regulatory framework** for AI governance, creating uncertainty and potential misuse.
  - The lack of clear **guidelines** for **ethical AI deployment**, **data privacy**, and **accountability** for AI-driven decisions, combined with the rapid evolution of AI systems, challenges traditional **regulatory approaches** and complicates **enforcement**.
- **Skill Gaps:** A large segment of India's workforce lacks the necessary **skills** to develop, manage, and utilize **AI systems** effectively, creating a gap between the growing demand for AI talent and the available workforce.
  - This gap is worsened by a disconnect between **academic training** and **industry needs**, as well as a **shortage of AI experts** to design advanced models and integrate them into **governance systems**.
  - Programs like **Responsible AI for Youth** aim to address this, but access remains uneven, especially in rural and underprivileged areas.
- **High Costs & Resource Allocation Challenges:** AI development is resource-intensive, demanding significant investments in **talent**, **infrastructure**, and **research**, while balancing **cost efficiency** with **scalability** continues to be a persistent challenge.
  - Setting up **AI infrastructure**, including **supercomputing facilities** and **data annotation centers**, requires significant **upfront investment**, while maintaining **AI systems** incurs ongoing costs for **data collection**, **model updates**, and **cybersecurity**.
  - **Smaller states** and regions often face **funding inequities**, limiting their ability to invest in AI and creating **disparities in adoption** across the country.
- **Cybersecurity:** It is a critical challenge in **AI integration** for governance, as AI systems can be susceptible to **cyberattacks**, **data breaches**, and **malicious manipulations**.
  - These risks threaten **data integrity**, **privacy**, and the **security** of digital governance infrastructure and services.
- **Ethical Biases:** AI systems are as unbiased as the data they are trained on; in **governance**, **biased datasets** can lead to **discriminatory outcomes**, marginalizing **vulnerable populations** and affecting **welfare schemes**.
  - For example, biased AI systems in welfare distribution could prioritize certain groups while excluding others based on historical inequities embedded in data.
  - The **"black box" nature** of AI systems, where the logic behind decisions is not transparent, erodes trust and makes accountability difficult.
  - Citizens and policymakers may struggle to validate or challenge AI-generated decisions, and if biases are not addressed, AI could exacerbate **systemic inequities** instead of mitigating them.

What are Government Initiatives to Boost AI Adaptability?

- **INDIAai Mission:** With a Rs 10,300 crore outlay, the INDIAai Mission focuses on developing **compute capacity**, **innovation centers**, and **datasets platforms**.
  - Indigenous AI model development ensures scalability and alignment with India's needs.
- **DPI Platforms Leverage AI:** India's DPI platforms, including **Aadhaar**, **UPI**, and **DigiLocker**, integrate AI for **seamless governance**.
  - The transformation of **CoWIN** into a national vaccination management tool illustrates the adaptability of AI in public service delivery.
- **Ethical AI Frameworks:** Initiatives like **Safe and Trusted AI** prioritizes **ethical, transparent, and accountable use of AI**, ensuring fairness, privacy, and inclusivity while building trust in AI-driven governance and minimizing risks of bias and misuse.
  - Collaborations like the **UNESCO-MeitY AI Readiness Assessment Methodology (RAM)** align AI governance with global ethical standards, ensuring transparency and trust.
- **Skill Development Programs Expand Access:** Programs like **Responsible AI for Youth** and INDIAai FutureSkills focus on bridging skill gaps, especially in rural areas.
  - These initiatives democratize access to AI education, fostering a workforce equipped for the AI revolution.
- **R&D Ecosystem to Strengthens Innovation:** The National Research Foundation (NRF) fosters collaboration among academia, industry, and government.
  - This approach accelerates the development and deployment of AI solutions tailored to India's unique requirements.
- **International Partnerships:** The US-India AI Initiative explores AI applications in critical sectors like healthcare and agriculture.
  - Regional efforts, such as **Telangana's Applied AI Research Centre**, address local challenges in mobility and public health.

What Should be the Way Forward to Leverage AI in Governance?

- **Strengthen Computational Infrastructure:** Invest in cloud computing, **data centers**, and **distributed networks** to ensure that AI systems can handle increasing demands.
  - Prioritize rural areas by enhancing reliable **internet connectivity** and computational resources, bridging the **rural-urban digital divide**.
- **Enact Comprehensive AI Policies:** India must establish **comprehensive legislation** addressing **transparency**, **bias mitigation**, and **accountability** in AI systems to ensure ethical deployment.
  - Aligning domestic policies with global standards like the EU Artificial Intelligence Act will make India's frameworks internationally competitive.
- **Democratize AI Education:** Expand initiatives like **INDIAai FutureSkills** to provide AI training in underserved areas, targeting rural and marginalized communities.
  - Utilize **online platforms** to deliver scalable education, ensuring inclusivity for learners from diverse socio-economic backgrounds.
- **Foster Public-Private Collaboration:** Encourage partnerships where private sector innovation complements **public infrastructure**, driving AI advancements tailored for governance.
  - Programs like **INDIAai Compute Capacity** showcase the success of such collaborations, fostering innovation and cost-efficiency.
- **Ensure High-Quality Datasets:** Implement governance frameworks to ensure datasets are **accurate**, **accessible**, and **privacy compliant** for reliable AI training.
  - Unify fragmented datasets through platforms like the **IndiaDatasets Programme**, enhancing their utility for governance applications.
  - **Consent-based data sharing** in AI governance would promote **transparency, ensure privacy, empower citizens, and enable efficient**, personalized public services while fostering trust and supporting informed, data-driven policymaking.
- **Prioritize Inclusive AI Ecosystems:** AI systems must address India's **linguistic diversity** by offering support in regional languages, ensuring accessibility for all citizens.
  - Focus on developing tools for marginalized communities to bridge **socio-economic divides** and promote equitable access to governance.
- **Monitor and Adapt Policies:** Establish mechanisms for regular **impact assessment** of AI policies, ensuring they remain effective and relevant.
  - Use real-time **data-driven insights** to refine strategies, adapting governance systems to evolving technological and societal needs.
- **Enhancing cybersecurity:**For leveraging AI in governance there is a need to enhance **cybersecurity**.
  - By implementing AI-driven solutions for real-time threat detection, predictive analysis, and automated responses, India can strengthen its **Digital Public Infrastructure (DPI)**, protect critical data, and improve **national security**, ensuring secure and efficient service delivery.

What can India learn from the EU's AI Act?

- **Risk-Based Approach**: The EU's AI Act classifies AI systems into categories based on their potential risk, imposing **stricter regulations** on high-risk applications like **healthcare** and **critical infrastructure**.
- **Transparency and Accountability**: It mandates that AI systems be **transparent**, with clear explanations of how decisions are made, and ensures **accountability** for developers and users.
- **Data Privacy and Safety**: The Act enforces strict data protection requirements, **emphasizing privacy** and the safeguarding of **individuals' rights** while deploying AI technologies.

Conclusion

GovAI is the **next frontier** in India's digital governance journey, leveraging AI to make governance **targeted, inclusive, and efficient**. By combining **DPI** with AI, India can set a global precedent, demonstrating how technology transforms public administration. As the Chair of **GPAI**, India's leadership in **trusted partnerships** will ensure AI's potential benefits are shared globally, making governance the **killer app** for AI and solidifying the nation's role as a **tech-driven trailblazer**.

India's South Asia Strategy

This editorial is based on "Is India really 'neighborhood first'?" which was published in The Indian Express on 19/11/2024. The article highlights India's strained ties with neighbors like Nepal, Maldives, and Bangladesh, emphasizing the need to shift from an assertive approach to a "neighborliness first" policy based on mutual respect and non-interference.

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

India finds itself at a crossroads in South Asia, where strained ties with neighbors like **Nepal, Maldives, and Bangladesh** signal growing discontent with its traditional approach to regional diplomacy. The reliance on **geographic dominance** and assertive policies is increasingly counterproductive, as smaller nations deftly leverage China to balance India's influence.. This calls for a shift from a **"neighborhood first" policy to a more inclusive "neighborliness first"** approach, emphasizing mutual respect, non-interference, and addressing the aspirations of smaller nations.

What is the Significance of Neighbourhood First for India?

- **Strategic Security Imperatives:** India's **15,106.7 km of land borders and 7,516.6 km of coastline** make neighborhood stability crucial for national security.
  - The policy helps counter **China's "String of Pearls" strategy**, which aims to encircle India through military and commercial facilities.
  - Collaborative security initiatives, like th**e joint India-Maldives-Sri Lanka maritime exercise 'Dosti',** emphasize regional unity in safeguarding shared waters.
- **Economic Integration and Growth: South Asia**, with a population of 2 billion, represents significant economic potential.
  - The average exports share of India in the **SAARC region** has been 5.9% of its total product, highlighting growing regional trade importance.
  - Infrastructure initiatives like the **India-Myanmar-Thailand trilateral highway** and **Chabahar Port** development in Iran provide crucial trade connectivity.
  - These economic linkages are vital for India's **$5 trillion economy goal by 2025.**
- **Energy Security and Resource Management:** Regional cooperation is crucial for managing shared resources, particularly water from rivers like **Ganges, Brahmaputra, and Indus**
  - Growing energy demands require regional solutions - for instance, **India has permitted Nepal to export an additional 251 MW of electricity**, marking the first instance of the Himalayan nation supplying power to Bihar.
  - Cross-border electricity trade initiatives like the **Bangladesh, Bhutan, India, Nepal (BBIN) Power Trade Agreement** facilitate optimal resource utilization.
- **Cultural and Civilizational Bonds:** The region shares deep **historical, cultural, and religious ties spanning millennia**.
  - India's soft power initiatives like the **Buddhist Circuit tourism** strengthen these bonds.
  - Cultural diplomacy through initiatives like the **South Asian University in Delhi** builds regional understanding. These connections **help counter growing anti-India narratives in neighboring countries.**
- **Maritime Domain Awareness and Control**: India's strategic location commanding key Indian Ocean trade routes makes regional maritime cooperation vital.
  - **Information Fusion Centre-Indian Ocean Region (IFC-IOR)** launched in 2018 promotes maritime domain awareness with regional partners.
  - Coastal security cooperation helps combat **maritime crimes** - like in March 2024, a joint operation by the NCB, Indian Navy, and Gujarat ATS seized 3,300 kg of drugs from a dhow **60 nautical miles off the Indian Ocean coast,** arresting five foreign nationals with suspected Pakistani links, the **largest offshore drug bust in India.**
- **Global Power Aspirations:** Strong regional influence is crucial for India's global power ambitions as a leader of the Global South.
  - Leadership in regional organizations like **BIMSTEC (Bay of Bengal Initiative)** demonstrates regional stewardship.
  - Successful regional cooperation strengthens **India's case for UNSC permanent membership.**
  - The Neighbourhood policy helps establish India as a responsible power capable of managing regional affairs. Also, Regional support is crucial for **India's global initiatives like International Solar Alliance (ISA)**

What are the Key Challenges India is Facing in the South Asian Region?

- **Territorial Disputes**: Territorial disputes remain a significant barrier to peace and cooperation in South Asia.
  - The long-standing **conflict over Kashmir between India and Pakistan** continues to fuel tensions, while unresolved border issues with China add another layer of complexity.
    - India's recent decision to **refrain from traveling to Pakistan for the 2025 Champions Trophy (Cricket)** reflects the broader challenges in maintaining normalcy in such relationships.
  - These disputes often lead to **military confrontations and diplomatic standoffs** like the **Galwan Valley Standoff in 2020** that distract from cooperative efforts on regional development.
- **Rising Chinese Economic Influence and Debt Diplomacy:** The Belt and Road Initiative (BRI) has dramatically **increased China's footprint in South Asia,** with investments exceeding **$200 billion in the region.**
  - **Sri Lanka's Hambantota Port,** leased to China for 99 years after debt default, stands as a stark example of debt-trap diplomacy.

- **Pakistan** has received over $62 billion through China Pakistan Economic Corridor (CPEC), while in the 2023-24 fiscal year, China committed NPR 254.7 billion to **Nepal,** making up 51.4% of the country's total foreign investment.
- **Bangladesh**, traditionally India's close ally, has accepted Chinese investments worth $26 billion in infrastructure projects.
- This economic penetration has **directly challenged India's historical role** as the region's primary development partner.

➢ **Diminishing Political Capital and Trust Deficit:** Recent political transitions have highlighted India's waning influence- The **Maldives' newly elected President has prompted demands for the removal of Indian military presence.**

- Nepal under **K P Oli has shown a clear pro-China tilt.** The fallout from India's perceived interference in **Nepal's 2015 constitution-making process** and subsequent unofficial blockade continues to sour relations.
- Bangladesh's new government under **Mohammed Yunus** represents a shift from the previously **India-friendly regime.**
- Myanmar's military coup and ongoing civil conflict have implications for India's Act East Policy and management of the North Eastern border.

➢ **Security Challenges and Strategic Vulnerabilities:** The China-Pakistan military nexus has evolved into a more sophisticated threat, with Pakistan acquiring advanced Chinese military technology including **J-10C fighters and Type 054A/P frigates**.

- Reports indicate a **20% increase in piracy incidents in 2023**, with notable attacks such as the **hijacking of the** MV Chem Pluto off India's west coast underscoring the evolving nature of maritime terrorism
- **Pakistan's continued support to cross-border terrorism evident in the recent** Reasi terrorism attack, remains a persistent threat.

➢ **Economic Integration Barriers:** SAARC's ineffectiveness, largely due to **India-Pakistan tensions,** has stalled regional economic integration.

- Intraregional trade accounts for barely **5% of South Asia's total trade,** compared to the ASEAN region where intra regional trade makes up **25%.**
- The **Bangladesh, Bhutan, India, Nepal (BBIN) initiative's slow progress, particularly in implementing the Motor Vehicles Agreement,** exemplifies regional connectivity challenges.
- Cross-border infrastructure projects face delays - for instance, **India-Nepal Pancheshwar Multipurpose Project,** conceived under the Mahakali Treaty of 1996, has faced significant delays.

➢ **Resource and Environmental Challenges**: Water-sharing disputes in the region have escalated, particularly with **India's unresolved Teesta river agreement with Bangladesh.**

- At the same time**, China's extensive dam-building activities on rivers** flowing from its upper riparian positions are increasingly threatening India's water security, potentially reducing the flow of vital rivers like the **Brahmaputra**.
- Climate change impacts, particularly rising sea levels threatening **Maldives and Bangladesh,** create potential for mass displacement and regional instability.
- Energy security concerns are growing as **India competes with China for access to regional resources** - evident in the **competition for Myanmar's gas fields and Sri Lankan energy projects**.

➢ **Cultural and Identity Politics:** The rise of **religious nationalism** across the region complicates India's secular diplomatic stance.

- Treatment of minorities in neighboring countries (like **Hindus in Pakistan and Bangladesh**) creates domestic political pressures on Indian foreign policy.
- The Rohingya refugee crisis strains resources and tests regional relationships.
- Issues like the Citizenship Amendment Act(CAA) have impacted India's relationships, particularly with Bangladesh, where concerns about potential refugee influx exist.

What Measures can India Adopt to Strengthen its Neighbourhood First Policy?

➢ **Economic Integration and Trade Facilitation:** Initiate a Comprehensive Economic Partnership Agreement (CEPA) specifically for South Asian neighbors with reduced tariffs and simplified customs procedures.

- Establish Special Economic Zones **(SEZs) along border areas with Nepal, Bangladesh, and Myanmar** to boost cross-border trade and local development.
- Develop **integrated check posts (ICPs) with modern facilities,** single-window clearance, and digital payment systems to reduce trade barriers.

- Launch a **regional e-commerce platform to facilitate direct business-to-business** and business-to-consumer trade within the region.

- **Infrastructure and Connectivity Enhancement**: Fast-track completion of ongoing projects like **India-Myanmar-Thailand Trilateral Highway** and **extend it to Cambodia and Vietnam.**
  - Develop **multi-modal transport corridors** connecting Indian ports with landlocked neighbors through rail, road, and inland waterways.
  - Establish **cross-border energy grids** and **gas pipelines** to create an integrated regional energy market.
  - Modernize **border infrastructure with advanced surveillance systems**, better roads, and trading facilities.
  - Implement **BBIN Motor Vehicles Agreement** fully with technology-based tracking and documentation systems.
- **Digital and Technology Cooperation:** Create a **South Asian Digital Hub** for sharing expertise in fintech, e-governance, and digital public infrastructure.
  - Extend India Stack (UPI, Aadhaar) technologies to neighboring countries to facilitate cross-border digital transactions.
  - Establish a regional cyber security coordination center to **combat cyber threats and share intelligence.** Launch dedicated satellites for improved regional connectivity and disaster management.
- **Cultural and Educational Exchange:** Increase Indian Council for Cultural Relations scholarships for students from neighboring countries with focus on technical and professional courses.
  - Establish more **South Asian Universities** in border states focusing on regional languages, culture, and development studies.
  - Create a **Regional Cultural Circuit** connecting **Buddhist, Islamic, and Hindu heritage sites** across borders.
  - Launch joint media initiatives including co-production of content and journalist exchange programs.
- **Security Cooperation Framework** Establish a **Regional Counter-Terrorism Coordination Center** with real-time intelligence sharing capabilities.
  - Create joint border management teams with neighboring countries for **coordinated patrol and crisis response.**
  - Develop a shared maritime domain awareness platform with **automated vessel tracking and threat assessment**.
- **Environmental and Resource Management:** Establish a **Regional Climate Action Task Force** for coordinated response to environmental challenges.
  - Implement **shared early warning systems for natural disasters** and environmental emergencies. Create a regional **carbon trading market** to promote clean development.
- **Skill Development and Employment:** Launch **Regional Skill Development Initiative** focusing on **sectors with high employment potential.**
  - Create cross-border industrial training institutes with standardized certification systems. Develop regional labor market information systems for better skill-demand matching.
  - Implement **mutual recognition of professional qualifications across the region.**
- **Local Government Cooperation**: Establish **Sister City partnerships between border cities for cultural and economic cooperation.**
  - Create Joint Development Councils for border districts with coordinated planning.
  - Develop **integrated urban planning for border cities with shared facilities**. Create mechanisms for regular interaction between local government officials.
- **Green Border Initiative:** Establish cross-border renewable energy corridors with solar and wind projects jointly operated by neighboring countries.
  - Create **'Green Buffer Zones' along borders with joint forest management and biodiversity conservation.**
  - Develop shared waste management and recycling facilities in border regions. Also, Launch joint **climate-resilient agriculture projects in border areas.**

Conclusion:

The road ahead for India in South Asia requires a fundamental shift in approach to its neighbors. A genuine commitment to **mutual development, non-interference, and addressing common concerns is paramount.** By prioritizing economic integration, addressing security challenges, and fostering cultural exchange, India can reclaim its rightful place as a **regional leader and usher in an era of peace, prosperity, and shared progress in South Asia.**

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Fixing India's Growth-Employment Mismatch

This editorial is based on "Jobs: Bridging the gap between growth and quality" which was published in The Hindu Business Line on 18/11/2024. The article brings into picture the paradox of India's economic growth, where rising GDP fails to translate into quality employment, with low workforce participation, widespread informal jobs, and limited skill development threatening equity and sustainability.

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

India's impressive economic growth hides a troubling paradox**: the lack of quality job creation for its workforce**. With **40% of working-age individuals disengaged from the labor marke**t and women's participation limited to low-productivity sectors, the **employment challenge is acute.** Informal work dominates, social security is scarce, and formal training remains inaccessible to most. Despite being a tech powerhouse, **a third of youth are neither studying nor working**. Bridging this gap **between growth and equity** is crucial for ensuring social justice and sustainable development.

What is the Current Status of Employment and Job Creation in India?

- **Labour Force Participation Rate (LFPR):** The overall labour force participation rate **(15 years and above)** has increased from 49.8% in 2017-18 to **60.1% in 2023-24.**
  - The share of women in **salaried employment** has declined, while **self-employment** has surged (from 51.9% in 2017-18 to 67.4% in 2023-24).
  - Many women are engaged as **unpaid helpers in household enterprises** or **own-account workers**, highlighting limited job alternatives.
- **Informal Employment:** A significant share of the workforce continues to be employed in **informal enterprises** (proprietary and partnerships).
  - In 2023-24, **73.2% of workers were engaged in informal firms,** a marginal decline from 74.3% in 2022-23 but still higher than 68.2% in 2017-18.
- **Sectoral Distribution of Employment:** The share of workers in **agriculture** has risen from 44.1% in 2017-18 to **46.1% in 2023-24,** reversing the long-term trend of declining reliance on agriculture.
  - Employment in **manufacturing** has stagnated, remaining at around **11.4%** in 2023-24, compared to 11.6% in 2021-22.
- Unemployment Trends:
  - The **overall unemployment rate (15 years and above)** has declined from 6% in 2017-18 to 3.2% in 2023-24.
    - Youth unemployment has dropped from 17.8% in 2017-18 to 10.2% in 2023-24, yet remains high.
  - Unemployment is **disproportionately higher among the educated workforce**, with individuals having a secondary level of education or higher facing greater challenges in finding jobs.

Why is India's Economic Growth Failing to Generate Quality Employment Opportunities?

- **Structural Issues in Job Creation:** Despite a robust GDP growth rate of around **6.5–7% in 2024-25**, India's job creation has not kept pace with its economic expansion.
  - According to the government's own labor force surveys, the country's worker-to-population ratio has declined from **38.6% in 2011-12 to 37.3% in 2022-23**, indicating a troubling trend where economic growth is not generating enough jobs for the increasing workforce.
  - Production processes are becoming increasingly capital-intensive and labor-saving, as noted in the India Employment Report 2024, complicating efforts to generate employment.
- **Skills Mismatch Crisis:** India's education system **continues to produce graduates whose skills do not align with industry requirements,** creating a peculiar situation of simultaneous unemployment and unfilled positions.
  - The focus on theoretical knowledge over practical skills has created a workforce that requires significant retraining before becoming industry-ready.
  - Employability among engineering graduates stands over 60%, with **only 45% meeting industry standards**.
- **Gender Disparities in Employment:** India faces stark gender disparities in its labor market. While male Labour Force Participation Rate (LFPR) is a robust **78.3%**, the **female LFPR lags significantly at just 41.3%.**
  - This discrepancy **not only limits the potential workforce but also restricts economic growth** by not fully utilizing the talents and skills of half the population.
  - The decline in female workforce participation highlights systemic barriers that prevent women from entering or remaining in the labor market.

- Addressing these disparities is crucial for **improving job quality and ensuring that economic growth benefits all segments of society.**

- **Policy Focus on Corporate Incentives Over MSMEs:** Government policies have largely favored large corporations through **incentives and subsidies,** often neglecting **micro, small, and medium enterprises (MSMEs),** which are crucial for job creation.
  - The focus on attracting foreign direct investment has not translated into substantial job creation within local economies.
  - For instance, while manufacturing has seen some growth due to initiatives like **Make in India**, the benefits have **disproportionately favored larger firms rather than fostering a diverse array of job opportunities** across different sectors.
  - The **Economic Survey 2023-24** highlighted MSMEs' challenges, including formalization, financial access, market linkages, technology adoption, digitalization, infrastructure, and skilling gaps.
- **Digital Disruption and Traditional Job Displacement:** The rapid digitalization of India's economy is disrupting traditional employment patterns **faster than new job creation can compensate.**
  - While digital transformation creates high-skilled opportunities, it simultaneously eliminates numerous **middle-skilled jobs that historically provided stable employment.**
  - The gig economy's growth, though creating flexibility, has largely generated precarious employment without adequate social protection.
  - Gig economy workers reached 7.7 million in 2023 but over **77% of gig workers earn less than Rs 2.5 lakh annually in India.**
- **Policy Implementation Gap: I**ndia's ambitious policies for employment generation suffer from poor implementation and coordination between center and states.
  - **Labor Codes, while comprehensive on paper**, remain largely unimplemented due to state-level delays and bureaucratic hurdles.
  - Also, a large part of the informal workforce remains outside the ambit of these codes, limiting their reach.
- **Regional Economic Imbalance:** Economic growth and job creation remain concentrated in a few **urban centers**, creating a severe regional imbalance in employment opportunities.
  - The **lag in development of tier-2 and tier-3 cities** as new growth centers has led to unsustainable migration patterns.
  - **State-level disparities in infrastructure and business environments** perpetuate uneven development.

What are Government's Recent Initiatives Related to Employment?

- **Support for Marginalised Individuals for Livelihood and Enterprise (SMILE).**
- **PM-DAKSH (Pradhan Mantri Dakshta Aur Kushalta Sampann Hitgrahi).**
- **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA).**
- **Pradhan Mantri Kaushal Vikas Yojana (PMKVY).**
- **Start-Up India Scheme.**
- **Rozgar Mela.**
- **Indira Gandhi Urban Employment Guarantee Scheme- Rajasthan.**
- **Direct Benefit Transfer Scheme.**
- **Pradhan Mantri Mudra Yojana.**

What Measures can India Adopt to Complement Economic Growth with Quality Job Creation?

- **MSME Ecosystem Transformation**: Create integrated digital platforms **combining GST, banking, and compliance for operational ease**, following a one-stop-shop model.
  - Establish **sector-specific clusters** with shared infrastructure, testing facilities, and common technology centers in every major industrial district.
  - Provide **targeted financial support through specialized MSME banks and fintech solutions** with simplified credit assessment.
  - Implement single-window clearance systems at **district levels with time-bound approvals and digital tracking.**
  - Set up **mentorship networks linking large corporations with MSMEs for technology transfer** and market access.
- **Skills-Education Integration: Mandate industry internships in the final year of all professional course**s with standardized assessment frameworks.
  - Create district-level industry-led skill councils to ensure **curriculum relevance and continuous feedback mechanisms.**
  - Introduc**e digital skills, coding, and vocational training from secondary school level** with practical project-based learning.
  - Establish **real-time monitoring of training outcomes through industry partnerships and placement tracking**.

- **Local Economic Development:** Empower **city governments with financial and administrative autonomy** to create and implement local economic development plans.
  - Develop **specialized economic corridors linking tier-2 and tier-3 cities with integrated logistics** and industrial infrastructure.
  - Launch **Urban Employment Guarantee schemes** focused on municipal services, green infrastructure, and digital services.
  - Create **City Skill Development Centers aligned with local industry needs** and future growth sectors.
- **Advanced Manufacturing Push**: Create **integrated manufacturing zones with focus on both capital and labor-intensive sectors** for balanced growth.
  - Establish supplier development programs **linking large manufacturers with local MSMEs through technology and quality upgradation**.
  - Develop specialized workforce training programs for **Industry 4.0 technologies** while maintaining labor-intensive production lines.
  - Provide incentives for manufacturers maintaining minimum employment-to-investment ratios in key sectors.
- **Social Security Modernization:** Implement portable universal social security through unified digital platforms linking all welfare schemes.
  - Create a **comprehensive gig worker protection framework** including minimum wage guarantees and health coverage.
  - Design special schemes for informal sector workers with **government co-contribution and easy enrollment**. Develop micro-insurance products for vulnerable sectors with simplified claims processes.
- **Rural Enterprise Development:** Transform **Gram Panchayats into micro-enterprise zones with simplified regulations** and basic infrastructure support.
  - Establish **Rural Business Hubs linking FPOs with food processing and retail chains through digital platforms.**
  - Create **Rural Technology Centers focusing on agri-tech, renewable energy, and rural services innovation.**
  - Develop specialized credit products for rural entrepreneurs through **SHG-Bank linkage with credit guarantees**.
- **Green Economy and Job Transition:** Establish green technology training centers focusing on **renewable energy, sustainable agriculture, and eco-friendly manufacturing.**
  - Create specialized funding mechanisms for green enterprises with relaxed collateral requirements and longer repayment periods.
  - Develop **green industrial parks with shared environmental infrastructure** and waste management facilities.
  - Launch skill development programs specifically for **green jobs including solar installation and EV maintenance.**
- **Service Sector Modernization:** Develop specialized training programs for high-growth service sectors like **healthcare, tourism, and education**.
  - Create service sector excellence centers focusing on global standards and best practices.
  - Create specialized courses for emerging service sectors like **wellness tourism.** Develop service sector export promotion strategies **focusing on India's competitive advantages.**

Conclusion:

India's employment challenge requires a comprehensive and multi-faceted approach. By addressing **structural issues, fostering skills development, promoting inclusive growth, and strengthening social security,** India can bridge the gap between economic growth and quality job creation. This will not only ensure equitable development but also position India as a global leader in human capital development.

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Transforming India's Prison System

This editorial is based on "The long fight for accessibility, dignity in Indian prisons" which was published in The Hindu on 21/11/2024. The article brings into picture the systemic neglect and abuse faced by prisoners with disabilities in India. Despite judicial directives and international obligations, prison conditions remain appalling, particularly for vulnerable inmates.

Tag: S Tag: GS Paper - 2, Social Empowerment, Issues Arising Out of Design & Implementation of Policies

India's prison system stands as a stark testament to systemic failures, characterized by **chronic overcrowding,**

human rights violations, and persistent neglect of fundamental prisoner welfare. Despite multiple judicial interventions and policy recommendations since the 1980s, prison conditions remain appalling, with facilities operating far beyond their intended capacity. The systemic breakdown is particularly evident in the **treatment of vulnerable populations, including prisoners with disabilities** who face extreme marginalization and denial of basic human dignity.

How Prisons are Regulated in India?

- **Constitutional Provisions:**
  - **Article 21:** It protects prisoners against torture and inhuman treatment.It also ensures timely trials for prisoners**.**
  - **Article 22:** An arrested person must be promptly informed of the reasons for their arrest and has the right to consult and be defended by a lawyer of their choice.
  - **Article 39A:** Ensures free legal aid to ensure justice for those unable to afford legal representation
- **Legal Framework:**
  - **Prisons Act, 1894**: The Prisons Act, enacted during British rule, serves as the foundational legal framework for prison management in India.
    - It focuses on the **custody and discipline of prisoners** but lacks provisions for rehabilitation and reform.
  - **The Identification of Prisoners Act, 1920**: This law governs the identification process for prisoners and the collection of biometric data.
  - **The Transfer of Prisoners Act, 1950:** It provides guidelines for the transfer of prisoners between different states and jurisdictions.
- **Oversight Mechanisms**
  - **Judicial Oversight:** The Indian judiciary plays a critical role in overseeing prison conditions through Public Interest Litigations (PILs) and **specific cases addressing inmate rights.**
    - For instance, the Supreme Court in ***D.K. Basu vs. State of West Bengal (1997),*** mandated strict protocols for arrest and detention.
    - Recent directives from the Supreme Court have emphasized the need for states to ensure compliance with human rights standards..
- **Related International Frameworks:** Several international agreements and conventions set global standards for the treatment of prisoners and the prevention of torture including:
  - Universal Declaration of Human Rights (UDHR) (1948), Declaration on Protection from Torture (1975), Convention Against Torture and Other Cruel, Inhuman, or Degrading Treatment (1984).

What is the History of Prison Reform in India?

- **Pre-Independence Era:** Under British rule, Indian prisons were notorious for their harsh conditions, as the British authorities used imprisonment as a form of deterrence through severe punishment.
  - The Indian National Congress, in its demands, included prison reform as part of the **Indian Penal Code in 1920.**
- **Post-Independence Era:** In 1952, the **All India Jail Manual Committee** was established, which recommended the classification of prisoners, provision of medical care, and vocational training.
  - It also suggested th**e appointment of social workers and psychologists** to aid in prisoner rehabilitation.
  - In 1980, the Supreme Court's landmark judgment in ***Sunil Batra v. Delhi Administration*** brought attention to the **deplorable conditions in Indian prisons**, laying down guidelines for humane treatment, medical care, and access to legal aid for prisoners.
- **Recent Years:** In the 21st century, the government has made significant strides in prison reform.
  - The **2016 Model Prison Manual** was introduced to standardize prison management, focusing on prisoner classification, medical care, and vocational training.
  - In 2018, the **Prisons Development Fund** was launched to modernize prison infrastructure and support state-level improvements.
  - Model Prisons Act 2023 includes provisions for managing high-security and open jails, ensuring prisoner welfare through legal aid, parole, and good conduct incentives, and utilizing technology for transparent prison administration and security.

What are the Major Issues Related to Prisons in India?

- **Overcrowding and Capacity Crisis**: The Indian prison system is drowning under an unprecedented population surge, with official data revealing a **131% occupancy rate in many facilities nationwide (December 2022)**.

- In 2021, the crisis was most acute in Uttarakhand, Uttar Pradesh and Delhi where the occupancy rate crossed **180%** leading to increased health risks, limited access to basic amenities, and heightened potential for inter-prisoner conflicts.

- **Undertrial Imprisonment and Judicial Delays:** The undertrial crisis represents a fundamental breakdown of India's judicial system.
  - As per the Prison Statistics India Report 2022, **75.8% of India's prisoners are undertrials.**
  - As highlighted by recent Supreme Court directives, many undertrials remain incarcerated despite being eligible for release under provisions like **Section 479 of the Bharatiya Nagarik Suraksha Sanhita (BNSS)** due to bureaucratic inefficiencies
  - This systematic failure transforms prisons into **prolonged detention centers, effectively punishing individuals before legal conviction,** with some undertrials spending years imprisoned without formal sentencing.
- **Prisoner Rehabilitation and Mental Health Issues:** India's prison system remains **fundamentally punitive rather than rehabilitative,** with minimal infrastructure for psychological support, skill development, or social reintegration.
  - The absence of comprehensive mental health services creates **a cycle of institutional trauma,** with prisoners experiencing increased rates of depression, anxiety, and potential recidivism.
  - Various Indian studies have reported the current prevalence of mental illnesses ranging from **21% to 33% among the prisoners**
- **Prisoners with Disabilities and Accessibility**: The systematic neglect of prisoners with disabilities represents a critical human rights failure in India's correctional system.
  - A **2018 audit of Delhi's major prisons** by the Nipman Foundation exposed severe accessibility gaps, including **non-functional wheelchairs, inaccessible cells, and toilets** that fundamentally compromise human dignity.
  - The **Rights of Persons with Disabilities Act, 2016, and the Nelson Mandela Rules (2015)** mandate reasonable accommodations, yet implementation remains virtually non-existent.
- **Custodial Violence and Human Rights Violations:** Custodial violence remains a persistent and systemic issue in Indian prisons, with institutional mechanisms for accountability remaining critically weak.
  - The **National Human Rights Commission** reported over 1,850 custodial deaths in 2020-21, highlighting a culture of institutional impunity.
  - Recent high-profile cases like the **Sathankulam custodial deaths in Tamil Nadu** and numerous encounter killings have exposed the deep-rooted culture of institutional violence.
- **Caste-Based Discrimination:** Caste-based discrimination within prisons continues to be a significant issue affecting the treatment and rehabilitation of inmates from marginalized communities.
  - The **Supreme Court recently ruled against caste-based segregation** practices in Indian jails, declaring them unconstitutional.
  - Despite this landmark decision**, implementation remains a challenge** that undermines the dignity and rights of these inmates.
- **Gender-Specific Issues:** Women prisoners face unique challenges that are often overlooked in discussions about prison reform.
  - Of the 23,772 women in prisons, **18,146 (76.33%) are undertrials.**
  - Reports indicate that **female inmates are particularly vulnerable to sexual abuse and harassment** from both staff and male inmates.
  - The **absence of female guards in many facilities exacerbates this issu**e, leaving women without adequate protection or recourse against abuse.
  - Additionally, pregnant women in prisons often **lack proper prenatal care** and support services, highlighting systemic failures in addressing the needs of female inmates.

What are the Key Judicial Pronouncements Related to Prison Reforms?

- **Hussainara Khatoon v. Home Secretary (Bihar)**: The Supreme Court ruled that **free legal aid must be provided** to indigent accused individuals to ensure their right to a fair trial.
- **Charles Sobhraj v. The Suptd., Central Jail**: The Supreme Court acknowledged that **fundamental rights cannot be stripped away** simply because someone is incarcerated.
  - Overcrowding in prisons was declared a violation of human rights.
- **Sunil Batra v. Delhi Administration (1978)**: This case affirmed that prisoners retain their fundamental rights as long as they do not conflict with incarceration, including protection from cruel and inhuman treatment.

- **Rama Murthy v. State of Karnataka (1997)**: The Court noted critical issues within prisons such as overcrowding, delayed trials, neglect of health, and abuse, urging the government to implement reforms.

What Strategies can be Employed to Improve India's Prison System?

- **Infrastructure and Accessibility Reforms:** Implement the **July 2024 Ministry of Home Affairs' Accessibility Guidelines**, creating universal design principles for prison infrastructures that accommodate prisoners with disabilities.
  - Develop **modular prison designs that reduce overcrowding** through efficient space utilization and create separate zones for different prisoner categories.
  - Invest in sustainable prison infrastructures that **incorporate renewable energy, waste management, and ecological rehabilitation programs.**
  - Create specialized accommodation units for vulnerable populations**, including women, elderly, and disabled prisoners.**
  - Develop multi-purpose spaces that facilitate education, skill development, and psychological counseling.
- **Judicial Process Acceleration and Legal Support:** Implement a comprehensive judicial reform strategy focusing on **expediting trials through technology-enabled case management systems** and specialized fast-track courts.
  - Adopt the **Justice Amitava Roy Committee's recommendation of one lawyer for every 30 prisoners**, creating a robust legal support infrastructure that ensures meaningful legal representation for undertrials.
  - Expand the anticipatory bail mechanism, drawing from the ***Babu Singh v. State of Uttar Pradesh (1978) principles,*** to reduce judicial backlog while providing proportionate sentencing options.
- **Comprehensive Rehabilitation and Skill Development:** Transform prisons from punitive institutions to **rehabilitation centers by implementing mandatory vocational training, educational programs**, and psychological counseling.
  - Develop **public-private partnerships with industries** to create prison-based skill development programs that guarantee employment opportunities post-release.
  - Implement the **Mulla Committee's recommendations for creating a specialized Indian Prisons and Correctional Service** that emphasizes **rehabilitation-oriented training for prison staff.**
  - Introduce **mandatory mental health screening, counseling, and continuous psychological support programs** to address institutional trauma and reduce recidivism.
- **Technology-Enabled Prison Management:** Create a comprehensive **Prison Management Information System (PMIS)**.
  - Implement **blockchain-based secure data management systems** to ensure prisoner privacy while maintaining transparent institutional records.
  - Develop **a nationwide digital case tracking system that monitors undertrial duration**, automatically triggering review mechanisms for cases exceeding reasonable timeframes.
  - Leverage **artificial intelligence and machine learning** to predict case complexities and optimize judicial resource allocation.
  - Develop **telemedicine infrastructure** to provide specialized healthcare access, particularly for prisoners in remote locations or with limited medical facilities.
- **Transparent Institutional Oversight:** Establish an independent Prison Ombudsman with powers to conduct unannounced inspections, investigate human rights violations, and recommend systemic improvements.
  - Mandate **quarterly public reports detailing prison conditions, rehabilitation statistics,** and institutional challenges.
  - Develop a comprehensive whistleblower protection mechanism for prison staff and inmates to report institutional malpractices.
- **Specialized Prisoner Management Approaches:** Develop targeted intervention strategies for different prisoner categories, including **specialized programs for first-time offenders, long-term prisoners, and those with potential radicalization risks.**
  - Implement the **Krishna Iyer Committee's recommendations for specialized support for women and child criminals**, including gender-sensitive infrastructure and rehabilitation approaches.

Conclusion:

The pressing need of the hour is to **transform our Criminal Justice System(CJS) into a more efficient and effective mechanism.** This necessitates a comprehensive

overhaul, **extending beyond prison reforms.** By prioritizing rehabilitation, investing in mental health services, and safeguarding the rights of all incarcerated individuals, we can create a justice system that is both just and humane. The future of our society hinges on our ability to implement meaningful reforms across the entire spectrum of criminal justice.

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Rebuilding India's Agricultural Sector

This editorial is based on "Why farmers remain unhappy with the government" which was published in The Indian Express on 22/11/2024. The article brings into picture the challenges faced by India's agricultural sector, supporting 40% of the population, in balancing technological advancements with traditional practices. It highlights the need for a sustainable ecosystem that bridges innovation with farmers' needs while ensuring food security.

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

India's agricultural sector, employing **42.3% of the population,** stands at a critical juncture where **policy implementation faces significant structural challenges.** The interplay between technological adoption, from biotechnology to modern farming solutions, requires careful balance with traditional agricultural practices and farmers' acceptance. The fundamental challenge lies in building a sustainable agricultural ecosystem that effectively bridges the gap between **scientific innovations, ground-level implementation, and farmers needs while ensuring food security for the nation.**

How India's Agriculture Sector is Performing Currently?

- **Key Agricultural Metrics and Growth:** In the 2022-23 period, India achieved a **foodgrain production of 330.5 million metric tonnes (MT),** maintaining its status as the **second-largest producer globally.**
  - Additionally, horticultural output reached a record 351.92 million tonnes (MT), reflecting a 1.37% increase from the previous year.
- **Market Performance:** The Indian agricultural sector is **projected to reach a market size of US$ 24 billion by 2025.** The Indian food and grocery market is ranked as the sixth largest globally, with retail contributing 70% to sales.
  - For Kharif 2023-24, foodgrain production is estimated at 148.5 million tonnes, demonstrating continued growth in key agricultural outputs.
- Investment and Export Trends:
  - **Foreign Direct Investment (FDI)**: From **April 2000 to March 2024**, the agriculture services sector attracted **USD 3.08 billion in FDI**.
    - The food processing industry, a major segment of agriculture, garnered US$ 12.58 billion in FDI, **accounting for 1.85% of total FDI inflows.**
  - **Agricultural Exports**: India's agricultural and processed food products exports reached **USD 4.34 billion in 2024-25 (April-May).** Key exports included:
    - **Marine Products:** US$ 1.07 billion
    - **Rice (Basmati and Non-Basmati):** US$ 1.96 billion
    - **Spices:** US$ 769.22 million

What are the Key Challenges Confronting India's Agricultural Sector?

- **Climate Change Vulnerability:** The increasing frequency of extreme weather events is severely impacting crop yields and farming patterns across India.
  - Heat waves, **erratic rainfall, and unseasonal rains** have created unprecedented challenges for traditional agricultural calendars and crop choices.
  - In 2023, India experienced its **second-warmest year on record**. The Economic Survey 2023-24 highlights that extreme weather, reduced reservoir levels, and crop damage have impacted farm output and driven up food prices in the past two years.
- **Water Stress and Irrigation Inefficiency:** India's agricultural sector continues to be the **largest consumer of water** while operating at sub-optimal irrigation efficiency levels.
  - The dominance of **flood irrigation methods persists despite their high water wastage,** while micro-irrigation adoption remains low.
  - India uses **2-3 times more water for producing 1 ton of crop** compared to several developed and developing nations.
    - Notably, only **11% of India's agricultural land is under micro-irrigation**.
- **Land Fragmentation and Declining Farm Sizes:** The continuous division of agricultural land is severely impacting economic viability of farming operations and technology adoption.

- The **average farm size has shrunk**, making mechanization and modern farming practices increasingly difficult to implement effectively.
- The average landholding for farming among farmers in the country decreased from 1.08 hectares in 2016-17 to just **0.74 hectares in 2021-22.**

➢ **Market Access and Price Realization:** Farmers continue to face significant challenges i**n getting fair prices for their produce** due to multiple intermediaries and inadequate market infrastructure.

- Despite the establishment of **e-NAM and various market reforms,** the price spread between farm gate and retail remains high.
- An **RBI study** reveals that farmers receive **only a third of the price consumers pay for fruits and vegetables.**
- The **three farm laws repeal in 2021** highlighted the ongoing issues of market access and fair pricing, with farmers protesting the lack of adequate safeguards for **MSP (Minimum Support Price)** and concerns over corporate control of markets, further emphasizing the need for stronger reforms.

➢ **Technology Adoption Gap:** Despite being th**e third-largest startup ecosystem globally**, India's agritech penetration remains low with significant resistance to new technologies.

- The **digital divide** and lack of technical knowledge continue to hamper modern agriculture practice adoption.
- As of 2023, **only 30% of Indian farmers utilize digital technology in agriculture,** with rural digital literacy remaining at just 25%.

➢ **Post-Harvest Infrastructure Deficit:** India continues to face significant **post-harvest losses** due to inadequate storage, processing, and cold chain infrastructure.

- This gap particularly **affects perishable commodities** and reduces farmers' ability to hold produce for better prices.
- India's post-harvest losses amount to approximately **₹1,52,790 crore annually,** according to a **Ministry of Food Processing Industries** 2022 study.
- Also, over **90% of India's cold chain logistics sector** is fragmented and privately owned, lacking standardization.

➢ **Credit and Insurance Coverage:** Despite significant progress in institutional credit flow to agriculture, small and marginal farmers still **struggle with formal credit access.**

- The inadequate insurance coverage and delayed claim settlements continue to affect farmers' risk management capabilities.
- Only **41% of small and marginal farmers** accessed bank credit, while gross **non-performing assets** in the agriculture sector reached **9.8%.**

➢ **Soil Health Degradation:** Excessive chemical fertilizer usage and mono-cropping have led to severe soil degradation across major agricultural regions.

- The **indiscriminate use of NPK fertilizers** has created serious nutrient imbalances affecting long-term soil productivity.
- About **30% of India's land is experiencing degradation due to rising fertilizer consumption,** imbalanced use of fertilizers and wrong soil management .
- The **Soil Organic Carbon (SOC)** content in India has declined **from 1% to 0.3% over the past 70 years**, raising concerns for the agricultural sector(National Rainfed Area Authority).
- Additionally, the issue of **stubble burning** exacerbates **air pollution and soil health degradation,** further affecting agricultural productivity.

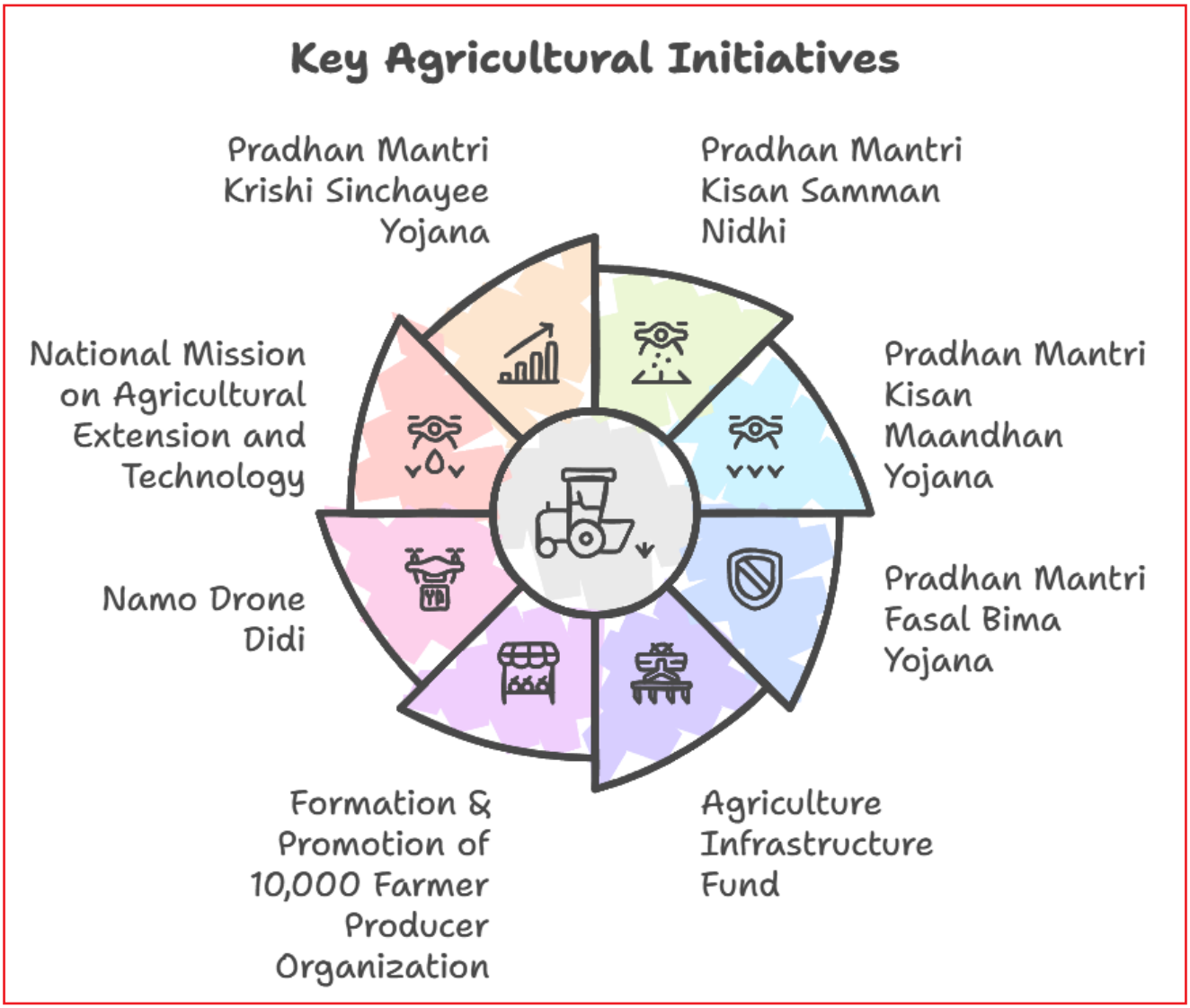
➢ **Crop Diversification Challenges:** Despite policy push, farmers remain locked in water-intensive wheat-rice cycles due to assured procurement systems and Minimum Support Price.

- Diversification to **pulses, oilseeds, and horticultural crops** faces market uncertainties.
- While India is the **largest producer of pulses in the world**, the production of pulses is not sufficient to meet the growing domestic demand of **22.42 million tonnes.**

➢ **Feminisation of Agriculture**: The feminization of Indian agriculture has led to women taking on a greater share of agricultural work while facing **limited access to resources like land, credit, and technology.**

- Nearly 63% workers are female in the agriculture sector at the pan-India level, but women own **only 11-13% of operational land holdings**, which restricts their decision-making power.
- This gender disparity in access to resources and opportunities **limits women's productivity and economic security in agriculture.**
- Furthermore, their work is **often undervalued and unrecognized, hindering their empowerment**.

What are the Key Government Initiatives Related to Agriculture?



What Measures can be Adopted to Strengthen India's Agriculture Sector?

- **Digital Agriculture Ecosystem:** Develop an integrated digital platform connecting all agricultural services - **from soil testing to market access.**
  - Implement **blockchain for supply chain transparency** and **fair price discovery**. Create a unified database linking land records, crop patterns, and credit history to enable precise policy interventions.
  - Launch mobile-based extension services with localized content in regional languages.
  - In the first quarter of the 2024-25, trade on the government's **e-NAM platform surpassed Rs 18,990 crore**, marking a significant step towards digitalisation of agriculture.
- **Climate-Smart Agriculture**: Integrate **weather-based agricultural advisories** with direct farmer messaging systems.
  - Promote **drought-resistant crop varieties** and **water-efficient farming** techniques through demonstration plots. Implement community-managed seed banks for climate-resilient varieties.
  - The Indian Prime Minister recently released **109 weather-resilient, high-yielding, and bio-fortified seed varieties** of agricultural crops is a significant step.
- **Water Management Revolution:** Mandate **micro-irrigation for water-intensive crops through incentive-based policies.**
  - Implement **community-led water budgeting** and crop planning based on water availability.
  - Promote precision irrigation technologies through **FPO-managed custom hiring centers.** Scale up **successful watershed development programs like Neeranchal Watershed Program** with clear outcome metrics.

- **Strengthening Farmer Producer Organizations(FPO):** Transform FPOs into comprehensive business entities handling **input supply, processing, and marketing.**
  - Provide dedicated business development support and market linkages. Create a **special credit rating system for FPOs to improve their access to formal credit.** Establish technology and quality control centers managed by FPOs.
  - The **"Viruthai Millets Farmer Producer Company Ltd (VMFPOL)"** in Tamil Nadu specialized in millets' production, value addition, and marketing, can be a role model.
- **Post-Harvest Infrastructure Development:** Establish **hub-and-spoke model for storage infrastructure at village** and block levels.
  - Implement PPP models for **cold chain development with assured procurement linkages.** Create multi-commodity storage facilities with quality testing laboratories.
  - **Punjab Agricultural University (PAU) initiative**, which introduced a paddy straw management system in Punjab can be expanded to other parts of the country.
- **Agricultural Credit Reforms:** Introduce **flexible credit products aligned with crop cycles and farmer incomes.**
  - Implement direct benefit transfer for interest subvention to improve targeting. Create **a specialized credit guarantee fund** for innovative farming practices. Develop credit products for allied activities and farm mechanization.
  - **Kerala's Farmer-Friendly Credit Model** enhances fruits and vegetable production, offers a viable model.
- **Soil Health Management**: Implement mandatory **soil health cards** linked to fertilizer sales through **PoS systems**.
  - Promote **bio-fertilizers and organic inputs through local production units**. Create village-level soil testing facilities managed by trained rural youth.
  - Introduce **performance-based incentives for improving soil organic carbon content**.
- **Sustainable Energy in Agriculture:** Promote **solar pump sets through community ownership models.** Implement **biomass-based power generation** using crop residues.
  - Create energy-efficient cold storage facilities using renewable energy. Develop solar-powered processing units at village level. **Modhera, a** village in the **Mehsana district of Gujarat** as India's first solar-powered village can serve as a model too.
- **Circular Agriculture Economy:** Implement **waste-to-wealth programs** converting agricultural residue into value-added products.
  - Establish composting clusters managed by **women's self-help groups for organic fertilizer production.**
  - Create **village-level biogas plants** using crop waste for local energy generation
- **Alternative Farming Systems:** Promote vertical farming in peri-urban areas using low-cost hydroponic systems.
  - Implement **aquaponics systems for small farmers** combining fish and vegetable production.
    - Develop **rooftop farming models for urban food security** and farmer income.
  - The **success of Mumbai's suburban vertical farms** shows viable alternatives.
- **Women Empowerment in Agriculture:** Create women-led agricultural technology training centers.
  - Implement **special credit schemes for women farmers** with simplified documentation.
  - The **"Mahila Kisan Sashaktikaran Pariyojana" (MKSP),** a sub component of the **Deendayal Antyodaya Yojana-NRLM (DAY-NRLM)** needs to be further strengthened.

Conclusion:

India's agricultural sector, a cornerstone of its economy and food security, needs a holistic approach, combining **government policies, private sector investment, and farmer-led innovation,** to unlock the sector's full potential. By embracing sustainable practices, empowering farmers, and leveraging technology, India can **not only meet its domestic food needs but also emerge as a global agricultural powerhouse.**

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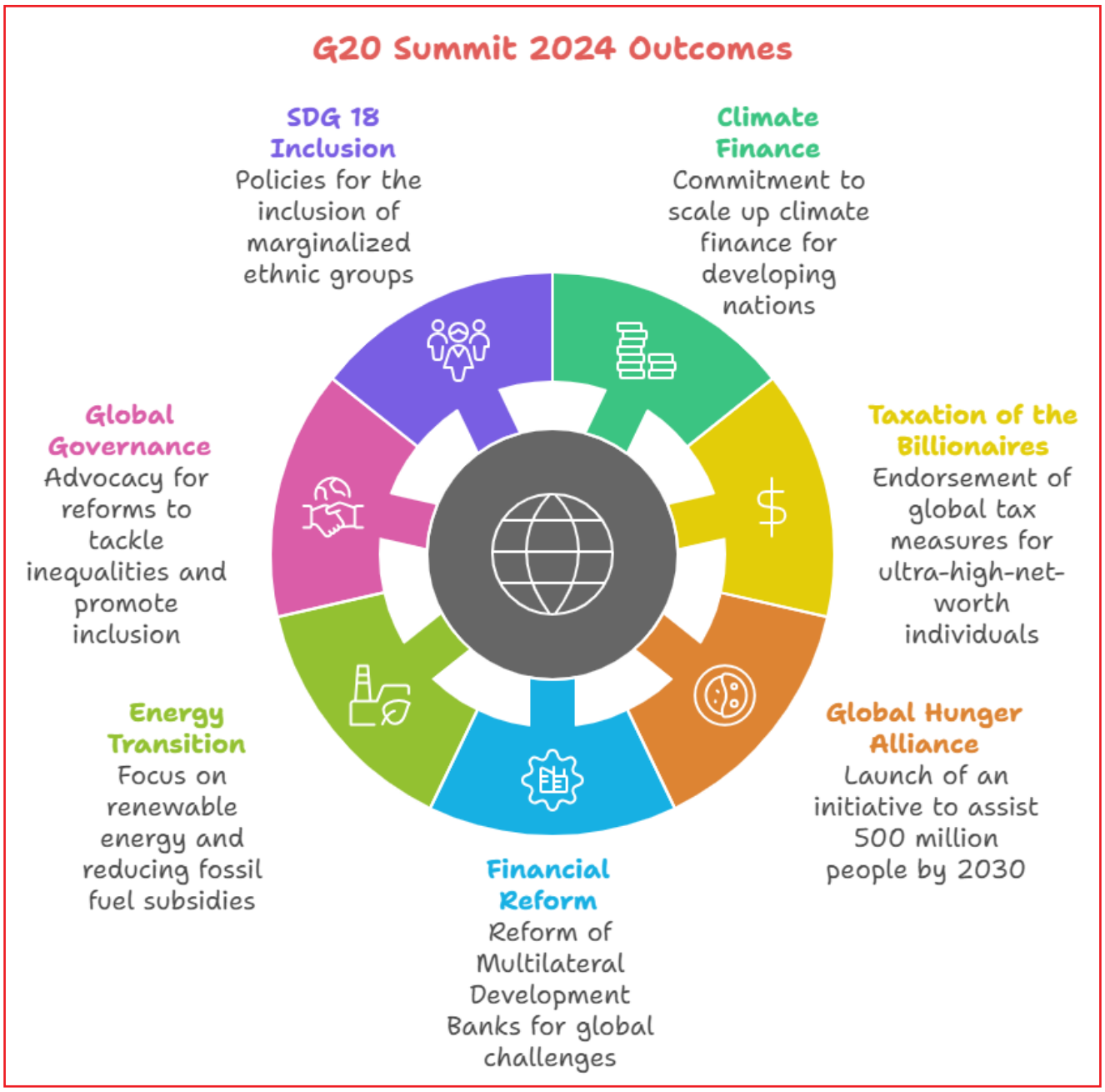
Brazil's G20: Building on India's Legacy

This editorial is based on "Global South seeks to put its imprint on G20" which was published in Hindustan Times on 18/11/2024. The article brings into picture Brazil's G20 presidency in Rio, which prioritized social inclusion, hunger reduction, and sustainable development, continuing India's 2023 human-centric approach. As part of the G20 Troika with Brazil and South Africa, India remains committed to fostering balanced global governance for developing nations.

Tag: GS Paper - 2, Bilateral Groupings & Agreements, Regional Groupings, Effect of Policies & Politics of Countries on India's Interests, Important International Institutions

Brazil hosted the **G20 summit in Rio de Janeiro,** carrying forward the momentum of inclusive governance established during India's presidency in 2023. Under Brazil's presidency, the G20 prioritized **social inclusion, hunger reduction, and sustainable development** - themes that aligned closely with India's previous presidency's **human-centric approach.** As part of the G20 Troika alongside Brazil and South Africa, India continues to ensure that the forum evolves towards more balanced global governance that represents developing world interests.



How has India Leveraged G20 to Enhance its Global Leadership Role?

- **Diplomatic Leadership:** India's successful **G20 presidency in 2023** established its position as a **bridge between developed and developing nations.**
  - The historic **inclusion of the African Union as a permanent G20 member** under India's leadership expanded the forum's representation.
  - India's diplomatic triumph was evident in achieving the **unanimous Delhi Declaration** despite deep geopolitical divisions.

- **Economic and Trade Opportunities:** G20 membership gives India **direct access to shape global economic policies**, particularly crucial as India aims to become a $5 trillion economy.
  - The **India-Middle East-Europe Economic Corridor (IMEC)** announced during India's G20 presidency represents a strategic alternative to **China's BRI,** potentially saving **40% of time in trade routes.**
  - India's **digital public infrastructure success,** particularly **UPI**, was endorsed by G20 as a model for developing nations.
  - These economic initiatives position India as **both a major market and a source of developmental solutions.**
- **Strategic Autonomy:** India's G20 role helps balance its **strategic autonomy,** particularly crucial in managing relations between the **US-led Western bloc and Russia-China axis.**
  - The establishment of **Global Biofuel Alliance** during India's presidency, demonstrates India's leadership in energy security and climate action.
  - India's successful navigation of contentious issues like **China's territorial expansionism** and **Russia-Ukraine conflict** during its presidency showed diplomatic maturity.
- **Sustainable Development and Climate Leadership:** India used the G20 platform to advance its climate commitments while **ensuring development rights of the Global South.**
  - India's **LiFE (Lifestyle for Environment) initiative** received global endorsement, with a commitment to reduce **1 billion tonnes of projected emissions by 2030**.
  - The **International Solar Alliance (ISA),** championed by India, saw increased G20 support.
- **Cultural and Soft Power Projection:** G20 provided an unprecedented platform for showcasing India's cultural heritage and modern capabilities.
  - The 200+ G20 meetings across India generated a huge chunk of tourism revenue.
  - India's presidency saw the launch of "**Culture Unites" initiative.** This cultural diplomacy strengthens India's position as a civilizational state with modern capabilities.

What are the Key Challenges Undermining the Effectiveness of the G20?

- **Consensus Building and Decision Implementation:** The growing **geopolitical tensions**, particularly evidenced in the Russia-Ukraine conflict, make **consensus-building increasingly difficult within G20.**
  - Recent summits have shown this challenge - **while India achieved consensus in 2023,** the **Bali summit in 2022 struggled to issue a joint communique**.
  - This implementation gap threatens **G20's credibility as an effective global governance forum.**
- **Global Economic Fragmentation:** The rise of **economic blocs like the European Free Trade Association** and protectionist policies threaten G20's ability to maintain global economic cooperation.
  - The trade coverage of the **trade-restrictive measures was estimated at USD 828.9 billion** which was up significantly from **USD 246.0 billion in the 2023 G20 Report.**
  - The growing US-China trade tensions have led to supply chain reorganization. **Global FDI fell by 12% in 2022 to $1.3 trillion,** reflecting growing economic nationalism.
- **Institutional Legitimacy and Representation:** Despite the **African Union's inclusion,** questions persist about G20's legitimacy in representing global interests.
  - Criticism continues regarding **overrepresentation of European countries (EU plus individual members)** while regions like Africa remain underrepresented.
  - The challenge of balancing efficiency with inclusivity remains central to G20's future relevance.
- **Climate Action and Development Trade-offs:** Balancing climate commitments with development needs **presents significant challenges for G20 members**.
  - Despite pledges, **G20 countries account for 80% of global emissions**.
  - The **promised climate finance of $100 billion annually remains unmet.**
  - Developing G20 members face particular challenges - **India alone requires $2.5 trillion by 2030 to fulfill its commitments under the Paris Agreement.**
  - The tension between immediate development needs and long-term climate goals continues to impede decisive action.
- **Debt Sustainability and Financial Stability:** Growing global debt levels pose significant challenges to **G20's economic coordination efforts.**
  - IMF reports global debt reached 238% of GDP in 2022, **with developing G20 members particularly vulnerable**.
  - The **Common Framework for Debt Treatment** has faced implementation challenges.

What Measures can be Adopted to Enhance the Effectiveness of G20?

- **Strengthening Implementation Mechanisms:** Create a **permanent G20 secretariat to maintain continuity and compliance tracking.**
  - Introduce **legally binding commitments with clear timelines** and accountability measures.
  - Develop an **automated tracking system for member commitments** with quarterly reviews. Establish financial incentives and penalties tied to implementation rates. Create a peer review mechanism for major commitments.
- **Reforming Decision-Making Process:** Implement **two-tier voting: consensus for strategic decisions, qualified majority for operational matters**.
  - Establish crisis resolution protocols for deadlock issues. Create specialized technical committees for complex policy areas.
  - Align with **Brazil 2024's success in achieving consensus on billionaire taxation and Global Alliance Against Hunger.**
- **Enhancing Financial Architecture:** Create dedicated funding mechanisms for climate finance implementation.
  - Scale up climate finance **"from billions to trillions"** as committed in **Brazil Summit 2024**.
  - Reform **Multilateral Development Banks** with enhanced capital adequacy frameworks. Establish standardized debt restructuring procedures. Develop innovative financing instruments for developing nations.
- **Strengthening Climate Action:** Create **binding commitments for climate finance with clear disbursement timelines.**
  - Establish technology transfer mechanisms between developed and developing members. Develop standardized emissions tracking systems. Institute climate action compliance monitoring.
- **Improving Crisis Management:** Establish a permanent emergency response coordination center. Create standardized protocols for **different crisis types.**
  - Institute rapid response funding mechanisms. Create crisis-specific task forces with clear mandates.
- **Tackling Global Economic Fragmentation:** Promote initiatives like the **"Global Supply Chain Resilience Forum"** within G20, focusing on minimizing disruptions caused by geopolitical tensions or economic nationalism.
  - Facilitate dialogues aimed at **minimizing protectionist policies,** supported by targeted incentives for multilateral trade agreements.
  - Launch a **G20 framework to attract FDI in green and digital technologies**, with emphasis on harmonizing tax regimes and reducing regulatory bottlenecks.
- **Enhancing Institutional Legitimacy and Representation:** Expand representation by including additional voices from underrepresented regions such as **South America, and small island developing states.**
  - Foster stronger engagement with **non-G20 nations, UN agencies, and civil society organizations** to ensure that global perspectives are reflected.
- **Ensuring Debt Sustainability and Financial Stability**: Reform the **Common Framework for Debt Treatment** by including private creditors and promoting greater transparency.
  - Promote initiatives **allowing debt-laden countries to exchange debt obligations** for investments in climate resilience projects.
  - Establish a permanent **debt observatory to monitor vulnerabilities,** provide early warnings, and propose preemptive measures for global financial stability.

Conclusion:

The G20 has emerged as a vital platform for addressing global challenges, and **India has skillfully leveraged** it to champion inclusive governance, economic resilience, and climate action. Strengthening institutional mechanisms, fostering equitable representation, and aligning development goals with climate commitments are essential for enhancing the G20's impact.

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India's Tech Regulatory Landscape

This editorial is based on "Big Tech's excesses" which was published in The Hindu Business Line on 22/11/2024. The article brings into picture the CCI's landmark penalty on Meta, emphasizing the intersection of privacy and competition law while highlighting India's need for a comprehensive data protection framework to address vulnerabilities in user rights.

Tag: GS Paper - 3, IT & Computers, GS Paper - 2, Government Policies & Interventions

Competition Commission of India's recent penalty on Meta marks a watershed moment in **tech regulation,** spotlighting the intersection of privacy and competition

law. The CCI's decision, triggered by **WhatsApp's controversial 2021 Privacy Policy,** challenges the coercive data-sharing practices of tech giants and their **abuse of market dominance.** Unlike the **EU's General Data Protection Regulation**, which prevented WhatsApp from implementing similar policies in Europe, India's **delayed implementation of Personal Data Protection Law** leaves users vulnerable to data exploitation.

What is the Current State of Technology Regulation in India?

- **Competition Law Framework**
  - **Competition Act, 2002**: Empowers the **Competition Commission of India (CCI)** to investigate and regulate anti-competitive practices, including those in digital markets.
    - **Key Amendments (2023)**: Deal value thresholds added to **address high-value acquisitions.**
  - **Notable Enforcements**: Actions against major tech companies like **Google and Meta** for abuse of market dominance.
- **Digital Infrastructure Regulations**
  - **Information Technology Act, 2000**: Serves as the primary legislation for governing **digital transactions, cybersecurity, and cybercrime.**
  - **IT Rules, 2021**: Comprehensive regulations targeting social media platforms, OTT services, and digital news media:
    - Mandates robust **grievance redressal mechanisms**.
    - Imposes obligations for **content moderation**, **takedowns**, and **user verification**.
- **Data Protection Framework**
  - Operates under **Section 43A** of the **IT Act** and **Digital Personal Data Protection Act 2023.**
- **Sector-Specific Regulations**
  - **Banking and Finance**:: RBI guidelines for fintech companies and digital payment platforms.
    - **RBI's Data Localization Norms** mandate local storage for payment data.
  - **Telecom and OTT**: **TRAI** regulations for over-the-top communication services.
    - It also sets telecom norms for digital infrastructure and internet services.
  - **Financial Markets**: **SEBI** guidelines for automated trading.
- **Consumer Protection Mechanisms**
  - **Consumer Protection Act, 2019**: Incorporates dedicated e-commerce guidelines.
  - **E-commerce Rules, 2020**: Focuses on **addressing unfair trade practices, fraudulent activities, and consumer rights** violations in digital marketplaces.
- **Proposed Legislation and Policies**
  - **Digital India Act**: Expected to replace the IT Act, 2000.
  - **National Data Governance Framework** (Draft): Focuses on data sovereignty and digital governance.

What are the Key Challenges in India's Technological Landscape?

- **Digital Divide and Infrastructure Gap:** India's digital transformation is severely hampered by the **urban-rural infrastructure disparity**, with rural areas lacking both quality connectivity and digital literacy.
  - The divide particularly affects marginalized communities**, creating a two-tier digital citizenship** that threatens inclusive growth.
  - According to **TRAI's October 2024 report,** while **urban teledensity** stands at **132.94%**, **rural teledensity** remains at just **59.05%**, highlighting the stark divide.
- **Fragmented Regulations**:India's technology sector faces regulatory inefficiencies due to overlapping jurisdictions of multiple agencies, leading to compliance confusion for businesses.
  - For instance**, data protection, digital content, and cyber laws** are governed by different authorities without a unified framework
  - This fragmented approach **increases operational complexity and slows innovation.**
  - Additionally, businesses operating globally face challenges in reconciling India's data localization mandates with international standards like the **EU's GDPR, creating barriers to seamless data flow and interoperability.**
- **Data Privacy and Security Vulnerabilities:** The lack of implementation of **Digital Personal Data Protection Act 2023** has left Indian citizens **vulnerable to data breaches and privacy violations,** particularly affecting sensitive sectors like healthcare and finance.
  - Tech companies continue to exploit this **regulatory vacuum by implementing invasive data collection practices** without adequate safeguards.
  - CERT-In reported **13.91 Lakh cyberattack incidents in 2022**, highlighting the gravity of the issue.
- **Platform Monopolies and Market Distortion:** Big tech companies' dominance in Indian digital markets has **created insurmountable entry barriers for local competitors**, stifling innovation and consumer choice.

- These monopolistic practices **extend beyond market dominance to data control and ecosystem lock-ins**.
- The concentration of power allows these platforms to dictate terms to both businesses and consumers.
- The CCI has imposed a **five-year ban on WhatsApp sharing data with Meta** and fined **Rs 213.14 crore for antitrust violations in India**, exemplifying the growing concern over market concentration.

- **AI Governance and Ethics:** India's rapid adoption of **AI technologies without corresponding ethical frameworks** and regulatory oversight creates risks of algorithmic bias and privacy violations.
  - The **absence of standardized testing and certification processes** for AI systems leaves citizens vulnerable to automated decision-making biases.
  - India currently lacks specific laws directly **addressing generative AI, deepfakes, and AI-related crimes that are on the rise.**
  - Two individuals in Bengaluru, India, were recently scammed out of **nearly Rs 1 crore** by fraudsters using deepfake videos of business leaders **N. R. Narayana Murthy and Mukesh Ambani.**
    - The **victims were lured into investing in fake trading platforms** promoted through these manipulated videos, highlighting the growing threat of deepfakes in financial fraud.
- **Digital Skills Mismatch**: The technology sector faces a critical talent crisis as **traditional education fails to keep pace with rapidly evolving industry needs**.
  - The skills gap particularly affects emerging technologies, creating a bottleneck in India's digital transformation journey.
  - The mismatch between education and industry requirements leads to both unemployment and unfilled positions.
  - Only **51.25% of India's graduates are employable**, with significant challenges in vocational training and skilling, according to the **Economic Survey 2023-24.**
- **Cross-Border Data Flow Restrictions** India's data localization requirements, while **aimed at sovereignty**, create operational inefficiencies and increased costs for global digital services.
  - The restrictions **impact India's position in the global digital economy** and affect service quality for Indian users.
  - The compliance burden particularly affects smaller companies and startups looking to operate globally.
  - Fintech firms usually spend around **6-10% of their operating costs on compliance.**
- **Content Regulation Balance:** The increasing **government control over digital content through takedown requests** and platform regulations threatens free expression and innovation in the digital space.
  - The **ambiguity in content moderation guidelines** creates uncertainty for platforms and content creators.
  - The regulatory framework often prioritizes control over fostering a vibrant digital ecosystem.
  - The Indian government submitted **63,852 requests for user data to social media giant Meta in the second half of 2022** (from July to December), second only to the US.
  - Also, recently the Supreme Court has halted the implementation of the **Fact-checking Unit (FCU) Rules** issued by the Union Government until the Bombay High Court decides on challenges to the **IT Rules amendment 2023,** citing serious **constitutional concerns affecting freedom of speech.**

What Lessons can India Learn from Other Countries in Terms of Technological Regulation?

- **European Union (EU):** The EU has established significant global influence through its regulatory frameworks, such as the **General Data Protection Regulation (GDPR).**
  - These regulations have not only affected EU-based companies but have had a global impact, with many international firms adopting EU standards in their operations, a phenomenon known as the **"Brussels Effect."**
- **Australia - News Media Bargaining Code:** Australia's innovative approach to platform-media relationships forced tech giants to negotiate fair compensation with news organizations.
- **South Korea - Platform Regulation** Korea's pioneering app store regulation **(first to mandate alternative payment systems)** and strong data protection framework offers valuable lessons.
- **Estonia - Digital Government**: Estonia's comprehensive e-governance framework, **with 99% of public services online**, showcases effective digital transformation.
- **Japan - Digital Platform Transparency**: **Japan's Transparency Act** focuses on fair business practices and disclosure requirements for major digital platforms.

What Steps can be Taken to Enhance India's Technological Regulatory Framework?

- **Unified Digital Regulatory Authority:** The creation of a **centralized regulatory body** would streamline the currently fragmented oversight of digital services and technology platforms.
  - This authority should integrate expertise from **CCI, TRAI, CERT-In, and other relevant bodies** to provide cohesive regulation across digital domains.
  - The UDRA could establish a **single-window clearance system for tech companies,** reducing compliance burden while ensuring comprehensive oversight building upon **Justice B.N. Srikrishna Committee's recommendations.**
  - The authority should be **granted autonomous status similar to RBI,** with technical experts leading specialized divisions for **AI, data protection, platform governance, and cybersecurity.**
- **Tiered Compliance Framework:** Implementing a size-based regulatory approach where **obligations increase with platform scale and market impact would balance innovation with oversight**.
  - Start-ups and small platforms would face minimal compliance requirements, while significant platforms would have enhanced responsibilities including mandatory audits and transparency reports.
  - This framework should include **clear thresholds based on user base, revenue, and market impact**, with specific compliance requirements at each tier.
- **Mandatory Interoperability Standards:** Developing and enforcing **interoperability standards for digital platforms** would reduce monopolistic control and enhance competition.
  - Key services like **messaging, social media, and digital payments should be required to support data portability** and cross-platform functionality.
  - The standards should be developed through multi-stakeholder consultation, with clear implementation timelines and technical specifications. This would include **mandatory APIs for data exchange and common protocols** for cross-platform communication.
- **Regional Digital Innovation Zones:** Establishing specialized technology zones across **tier-2 and tier-3 cities with simplified regulations** and infrastructure support to make decentralized innovation zones tied to **District Development Plans** ensuring equitable digital growth.
  - These zones should offer **tax incentives, high-speed connectivity, and regulatory sandboxes for testing new technologies** and business models.
  - The zones could focus on specific technological domains like AI, IoT, or blockchain, creating specialized ecosystems across regions. **Local universities should be integrated into these zones** to bridge the industry-academia gap.
- **Digital Literacy and Skill Development Framework:** Creating a **nationwide digital skills program** with standardized certification and industry recognition would address the technology talent gap.
  - The framework should **combine online learning platforms with hands-on training centers in partnership** with industry leaders.
  - Mandatory **digital literacy modules should be integrated into school curricula** and adult education programs.
  - Special focus should be given to **emerging technologies and regular curriculum updates based on industry needs.** The framework should include targeted programs for rural areas and underserved communities.
- **Data Protection Implementation Task Force:** Establishing a **dedicated task force to oversee the implementation of data protection regulations** would ensure effective enforcement and compliance support.
  - The task force should include **technical experts, legal professionals, and industry representatives** to provide practical implementation guidelines.
  - Regular audits and compliance reports should be mandated for organizations handling significant amounts of personal data.
  - The task force should also facilitate training programs for **Data Protection Officers and maintain a public registry of certified professionals**.
  - Launched in 2020 by the Ministry of Finance and RBI, **Data Empowerment and Protection Architecture (DEPA)** enables secure, consent-based data sharing through **third-party Consent Managers** enhancing data governance, and can serve as a model.
- **AI Governance Framework:** Developing a comprehensive AI governance structure with **clear guidelines for development, testing, and deployment of AI systems is crucial.**
  - The framework should establish **mandatory impact assessments for high-risk AI applications** and certification requirements for AI systems used in critical sectors.

- Regular audits of AI systems for bias and fairness should be mandated, with public reporting of results. The framework should include **clear liability provisions for AI-related incidents** and mandatory insurance requirements for high-risk applications.

- **International Collaboration to Harmonize Cross-border Data Flow:** Establishing **clear protocols for international data transfers** while protecting national security interests would facilitate global digital trade.
  - The protocol should include **standardized data classification systems and specific requirements** for different data categories.
  - Bilateral and multilateral agreements should be pursued for **mutual recognition of data protection standards.** The protocol should include emergency mechanisms for addressing cross-border data breaches and disputes.
- **Platform Competition Enhancement:** Implementing measures to **promote competition in digital markets** through mandatory app store alternatives and payment system choices like the **Unified Payments Interface (UPI)**, that has revolutionized digital payments in India by **fostering interoperability and reducing entry barrier**s for fintech companies.
  - Clear guidelines for **platform pricing and revenue sharing should be established to protect small businesses**.
  - The measures should include **mandatory disclosure of ranking algorithms and clear appeal mechanisms** for business users.

Conclusion:

India's tech landscape, while brimming with potential, faces significant regulatory challenges. A **comprehensive and adaptive regulatory framework** is crucial to balance innovation with consumer protection and national security interests. By learning from **global best practices and addressing the specific needs of the Indian context,** India can create a robust digital ecosystem that empowers citizens, fosters innovation, and drives economic growth.

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Revitalizing India's Urban Landscape

This editorial is based on "India's urban infrastructure financing, needs and reality" which was published in The Hindu on 25/11/2024. The article brings into picture the growing challenge of accommodating India's urban population, projected to reach 800 million by 2050, with a need for ₹70 lakh crore in infrastructure investment. It highlights the barriers of limited government spending, stagnant municipal finances, and declining public-private partnerships, urging structural reforms and collaborative governance for sustainable urban development.

Tag: GS Paper - 2, Urbanization, Separation of Powers, Local Self Governance, Government Policies & Interventions

India's urban population is set to double to **800 million in three decades**, necessitating **₹70 lakh crore** in **infrastructure investment by 2036.** However, limited government spending, stagnant municipal finances, and declining public-private partnerships hinder progress. Addressing this crisis requires **structural reforms, robust project pipelines, digital infrastructure adoption, and collaborative governance.** Strategic interventions over the next decade are critical to transforming India's urban landscape into a sustainable and inclusive ecosystem.

What are the Regulatory Frameworks Governing the Urban Landscape in India?

- **Constitutional Framework: 74th Constitutional Amendment Act (1992)** provides the foundation for urban governance by defining the **role of Urban Local Bodies (ULBs) like municipalities and municipal corporations**.
  - It calls for the devolution of functions like urban planning, water supply, sanitation, and public health to ULBs.
  - Municipal corporations are the primary regulators for urban areas, responsible for local services, waste management, taxation, and public amenities.
    - They derive their powers from state **Municipal Acts**.
- **Urban Planning and Development Authorities:** Urban planning is carried out by **Urban Development Authorities** (e.g., **Delhi Development Authority**) and state town planning departments.
  - These bodies prepare **Master Plans** and **Development Plans** to regulate land use, infrastructure development, and zoning laws.
  - For instance, **Delhi's Master Plan 2041** focuses on mixed land use and sustainable urban development.
- **Environmental Regulations:** Urban environmental governance is guided by laws such as:

- **Environment Protection Act, 1986:** Regulates pollution and sets environmental standards for industries and urban activities.
- **Solid Waste Management Rules, 2016:** Specifies guidelines for waste segregation, disposal, and recycling.
- **Air Act, 1981 & Water Act, 1974:** Regulate air and water quality in urban areas.

➢ **Land and Housing Regulation:** Land use and development are governed by **State Land Revenue Acts**, **Urban Land (Ceiling and Regulation) Act**, and local zoning laws.
- The **RERA (Real Estate Regulation and Development Act, 2016** has introduced transparency and accountability in real estate transactions, ensuring timely completion of projects.

➢ **Urban Transport Regulation:** Urban mobility is regulated through central and state laws such as the **Motor Vehicles Act, 1988**.
- National policies like the **National Urban Transport Policy (NUTP)** promote public transportation and sustainable mobility solutions.

➢ **Disaster Management in Urban Areas:** Urban disaster preparedness is regulated under the **Disaster Management Act, 2005**, with agencies like the **National Disaster Management Authority (NDMA)** playing a pivotal role.

What are the Key Issues Impacting the Development of India's Urban Landscape?

➢ **Urban Infrastructure Deficit:** Indian cities suffer from **crumbling infrastructure, unable to keep pace with rapid urbanization** and population growth.
- A report by the Ministry of Statistics and Programme Implementation reveals that as many as **431 infrastructure development projects,** each with investments of ₹150 crore or more, suffered a **cost overrun of ₹4.82 lakh crore**, as of December 2023.
- **Overburdened roads, bridges, and transport systems** are prone to failures, causing disruptions and fatalities.
- Recent incidents, such as the **canopy collapse at Delhi Airport (July 2024),** highlight the dire need for infrastructure resilience.

➢ **Air Pollution:** India's urban areas face severe air pollution caused by **vehicular emissions, industrial activities, construction dust, and stubble burning.**
- **39 of the world's 100 most polluted cities are from India.** Cities like **Delhi frequently record AQI levels** in the hazardous category, impacting public health and economic productivity.
- In November 2024, Delhi's schools were shut for days due to unbearable pollution levels. Initiatives like the **National Clean Air Programme (NCAP)** show promise but need rigorous implementation.

➢ **Water Scarcity and Management Issues:** Urban areas in India grapple with acute water scarcity due to over-extraction, contamination, and climate change.
- **Bengaluru 2024 and Chennai's 2019 water crisis** remains a stark reminder of the impending urban water disaster.
- Urban utilities are inefficient, with significant water losses during distribution and inadequate rainwater harvesting.

➢ **Housing and Slum Proliferation:** A surge in **rural-to-urban migration** has resulted in a widening housing gap, pushing many into informal settlements or slums.
- These areas lack basic amenities like **sanitation, clean water, and electricity, perpetuating cycles of poverty** and disease.
- Over a **third of India's slum population lives in its 46 million-plus cities**. Of the metros, Mumbai has the highest proportion of slum-dwelling households (41.3% of its population).

➢ **Traffic Congestion and Public Transport Deficiency:** With increasing private vehicle ownership and inadequate public transportation, **urban traffic congestion is worsening**.
- **Bengaluru and Pune** in India ranked among the world's top 10 worst traffic-hit cities.
- Peak travel times in cities like **Bengaluru** can extend over hours, leading to productivity losses and higher fuel consumption.

➢ **Waste Management Crisis:** **Urban waste management** systems struggle to cope with **rising solid waste generation**, with improper disposal practices creating environmental hazards.
- According to a report by **The Energy and Resources Institute (TERI),** India generates over **62 million tons (MT) of waste in a year.**
  - **Only 43 MT** of total waste generated gets collected, with **12 MT being treated before disposal**, and the remaining **31 MT simply discarded in wasteyards.**
- Mega-landfills like **Delhi's Ghazipur continue to expand**, **emitting toxic gases and polluting water bodies.**

- **Economic Disparities and Urban Poverty:** Urban areas face widening economic inequality, with **rising costs of living and inadequate job creation** for low-income groups.
  - The **urban informal sector,** employing a significant workforce, often lacks social security or stable wages.
  - Inflation, **particularly in food prices,** has hit urban households hard, reducing disposable income and spending power.
  - According to CMIE, urban unemployment stood at **8.7% in 2024.**
- **Climate Change Vulnerability:** More than **85% of districts in India** are exposed to extreme climate events such as **floods, droughts and cyclones,**
  - Urban planning often **overlooks resilience measures,** as seen in the **Chennai and Mumbai floods,** which are exacerbated by unplanned growth and encroachment on natural drainage systems.
  - Rising temperatures and **urban heat islands** worsen living conditions, especially for the poor.
  - India experienced **extreme weather on 93% of days in the first nine months of 2024,** causing 3,238 deaths and over 3.2 million hectares of crops.
- **Governance and Policy Implementation Gaps:** Urban governance in India suffers from **fragmented authority, overlapping jurisdictions**, and poor coordination among agencies.
  - **Municipal bodies often lack financial autonomy,** hindering the implementation of crucial development projects.
  - Despite ambitious programs like **Smart Cities Mission**, progress has been slow due to bureaucratic delays and limited capacity.
  - Also, urban India drives nearly **60% of the country's economic output**, yet municipal corporations struggle financially, with **property tax revenues at a mere 0.12% of GDP.**
- **Urban Sprawl and Loss of Green Cover:** Unregulated urban expansion has led to **encroachment on forests, wetlands, and agricultural land**, reducing green cover and biodiversity.
  - This unchecked growth **increases carbon emissions and creates urban heat islands,** worsening climate impacts.
  - For instance, Bengaluru's urbanised area has expanded by a staggering 1055% since 1973 consequently, **there has been an 88% reduction in vegetation.**
- **Urban Crime and Safety Concerns:** Rising urban crime rates, including **theft, cybercrime, and gender-based violence,** threaten the safety of city residents.
  - A lack of **adequate policing, poor urban design, and weak legal enforcement** contribute to this trend.
  - A 2023 NCRB report stated that **Delhi accounted for 29.04% of the 48755 crimes against women** reported in 19 major cities across the country.
- **Cultural Dilution and Urban Identity Loss:** Rapid urbanization often leads to the loss **of cultural heritage, traditional architecture, and local identity.**
  - Gentrification displaces indigenous communities, while generic urban designs fail to reflect local ethos.
  - Cities like Varanasi and Jaipur face challenges in balancing modernization with heritage preservation.
  - For example, **Folk arts like Kalbelia and Ghoomar from Rajasthan** are gradually fading as practitioners migrate to urban areas.

What are Major Government Initiatives Related to Urban Development?

- **Smart Cities**
- **AMRUT Mission**
- **Swachh Bharat Mission-Urban**
- **Pradhan Mantri Awas Yojana-Urban**
- **Aspirational District Programme**
- **Deen Dayal Antyodaya Yojana - National Urban Livelihood Mission (DAY-NULM)**

What Measures can be Adopted to Enhance India's Urban Landscape?

- **Strengthening Urban Governance and Decentralization:** Urban local bodies (ULBs) must be empowered through **financial autonomy and capacity building to execute urban development plans effectively**.
  - The **74th Constitutional Amendment** needs full implementation to empower ULBs.
    - Recent funding for municipal bodies under the **15th Finance Commission can act as a catalyst.**
- **Modernizing Urban Infrastructure**: Comprehensive infrastructure audits and upgrades are essential to ensure safety and efficiency.
  - **Public-Private Partnerships (PPPs)** can attract investments for transport, utilities, and housing. For instance, the **Delhi-Mumbai Industrial Corridor (DMIC)** showcases successful PPP models in urban development.

- Emphasis on **smart city infrastructure, such as automated traffic management systems**, can optimize urban operations.
- **Urban Infrastructure Development Fund (UIDF)** under the **2023-24 Budget** provides a dedicated mechanism for funding city-level improvements.

- **Promoting Affordable Housing and Slum Rehabilitation**: Expanding affordable housing schemes like **Pradhan Mantri Awas Yojana (PMAY) with private sector collaboration** can bridge the housing gap.
  - Inclusive zoning policies and incentives for developers to construct affordable units are vital.
  - Slum rehabilitation programs should **adopt in-situ redevelopment models, like Mumbai's Dharavi project,** ensuring minimal displacement.
- **Investing in Sustainable Urban Mobility:** Cities must expand metro systems, suburban rail networks, and public bus services to reduce dependency on private vehicles.
  - **Integrating last-mile connectivity with electric vehicles** and bicycle-sharing programs can enhance accessibility.
  - **Bengaluru's new metro expansion and Delhi's electric bus fleet** demonstrate the potential for impactful change.
  - **Smart traffic management systems**, coupled with congestion charges, can address traffic bottlenecks.
- **Advancing Solid and E-Waste Management:** Decentralized waste segregation systems at the ward level must be implemented to improve recycling rates and reduce landfill dependency.
  - Advanced technologies, such as **waste-to-energy plants and material recovery facilities,** can manage rising waste volumes.
  - **Extended Producer Responsibility (EPR) laws** must be enforced to curb e-waste generation by ensuring companies take back discarded electronics.
  - **Bengaluru's success in decentralized composting** serves as a replicable model.
- **Climate-Resilient Urban Planning:** Urban planning must integrate climate adaptation strategies to mitigate risks of floods, heatwaves, and rising sea levels.
  - Restoring **natural drainage systems and wetlands,** as seen in C**hennai's restoration projects**, can reduce urban flooding.
  - **Green roofs, vertical gardens, and urban forests** can combat heat islands and improve air quality. Renewable energy adoption, such as rooftop solar installations, must be incentivized.
- **Ensuring Urban Water Security:** Cities need comprehensive water management policies focusing on **rainwater harvesting, wastewater recycling, and aquifer recharge.**
  - **Chennai's rainwater harvesting mandate** has proven effective and can be scaled nationwide.
  - Smart water meters and IoT-based monitoring systems can prevent wastage and enhance efficiency.
  - Promoting **decentralized wastewater treatment plants (DEWATS)** can ensure effective reuse.
- **Promoting Digital Inclusion:** Expanding internet connectivity through initiatives like **BharatNet in urban slums can bridge the digital divide**.
  - Digital literacy programs targeting low-income groups can **enhance access to e-governance, telemedicine, and online education.**
  - Cities must adopt smart city solutions, such as **integrated command centers, to streamline urban operations**.
- **Revitalizing Cultural and Heritage Assets:** Urban development must prioritize the conservation of historical and cultural landmarks.
  - Adaptive reuse of heritage structures, as seen i**n Rajasthan's palace hotels**, can balance preservation with economic utility.
  - **Urban planning should mandate the integration of traditional architecture** and cultural elements. UNESCO's guidelines for heritage management can provide actionable frameworks.
- **Encouraging Participatory Urban Planning:** Citizen participation in urban governance can improve **transparency and accountability**.
  - Digital platforms for grievance redressal, such as **MyGov,** must be scaled for urban-specific issues.
  - **Participatory budgeting** allows residents to decide on local developmental priorities. Case studies from cities like **Pune show how citizen engagement improves urban planning outcomes.**
- rgy sources by **expanding rooftop solar installations and wind energy projects**.
  - **Smart grids with energy storage systems** can enhance efficiency and reduce power outages. Incentives for energy-efficient buildings, such as tax rebates, can encourage sustainable construction practices.
- Cities like **Cochin, which operates India's first fully solar-powered airport,** demonstrate the f**Mainstreaming Renewable Energy in Cities:** Urban centers must transition to cleaner eneeasibility of large-scale renewable energy adoption.

- **Strengthening Urban Disaster Preparedness:** Cities must establish **dedicated disaster response units** equipped to handle urban-specific risks like floods, earthquakes, and industrial accidents.
  - Early warning systems, **combined with real-time data from IoT sensors,** can mitigate disaster impacts.
  - Lessons from **Mumbai's flood response** can guide urban disaster preparedness strategies.

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Building a Semiconductor Ecosystem in India

This editorial is based on "India, US semicon partnership on good wicket" which was published in The Hindu Business Line on 26/11/2024. The article brings into picture the intensifying global semiconductor race, highlighting strategic US-India collaborations like iCET to counter China's dominance. It underscores India's semiconductor mission as a pivotal step toward building a robust ecosystem, bridging talent gaps, and emerging as a trusted global technology partner.

Tag: GS Paper - 3, Achievements of Indians in Science & Technology, IT & Computers, Nanotechnology, Robotics, Indigenization of Technology, Intellectual Property Rights, Technology Missions, Scientific Innovations & Discoveries, Infrastructure

The **global semiconductor industry** stands at a critical geopolitical crossroads, with the **United States and India** forging strategic partnerships to challenge China's technological dominance. Through initiatives like **iCET and the CHIPS**, both nations are investing billions to develop robust semiconductor ecosystems, focusing on critical technologies, talent development, and supply chain resilience. India's semiconductor mission represents a transformative opportunity to **indigenize electronic manufacturing, overcome talent shortages, and emerge as a trusted global partner in high-tech innovation.**

What is the Current Status of India's Semiconductor Sector?

- **Market Size:**
  - In 2022, the Indian semiconductor market was valued at $26.3 billion and is projected to grow at a CAGR of **26.3% to reach $271.9 billion by 2032.**
- Import-Export Trends:
  - Semiconductor imports significantly outpace exports; however, exports have grown from **$0.21 billion (2017)** to **$0.52 billion (2022)**.
    - The pandemic disrupted global trade, but a strong recovery in 2021 reflected India's push towards establishing itself in the semiconductor value chain.
- Government Initiatives:
  - **India Semiconductor Mission (ISM):** Aims to build a robust semiconductor ecosystem with fiscal incentives of **50% project cost** for fabs and display units.
  - **Semicon India Programme (2021):** Allocated **₹76,000 crore ($9.2 billion)** to accelerate manufacturing and R&D.
  - **International MoUs:** Partnerships with the **European Commission** and **Japan** to strengthen supply chains and ecosystem collaboration

Why Investing in Semiconductors is Crucial for India?

- **Strategic Importance in Geopolitics:** India's geopolitical positioning and its aspirations for **self-reliance make domestic semiconductor production** crucial.
  - For instance, the **US-China tech war highlights the need for semiconductor independence.**
  - According to WSTS, the global semiconductor market is expected to **grow to $1 trillion by 2030**, and India's semiconductor consumption is projected to exceed **$100 billion by 2026,** driven by the electronics and automotive sectors.
- **Boost to Domestic Manufacturing under Atma Nirbhar Bharat:** Semiconductors are the backbone of electronics manufacturing, a sector targeted by the Indian government under the **"Make in India" and "Atma Nirbhar Bharat" initiatives.**
  - India aims to achieve a 10% share in the global semiconductor market by 2030.
  - Local production can reduce import dependency, which currently costs **India $24 billion annually on semiconductor imports**
  - The **Semiconductor Mission, with a $10 billion outlay for manufacturing incentives**, aims to establish India as a global hub for chip production, supporting industries like mobile manufacturing and 5G.
  - Tata Electronics has completed the Definitive Agreement with Powerchip Semiconductor Manufacturing Corporation (PSMC) of Taiwan to launch **India's first AI-enabled semiconductor Fab in Gujarat.**
- **Economic Growth and Job Creation:** Investing in semiconductor manufacturing can significantly boost **India's GDP and create millions of jobs across sectors.**

- With plants like **Vedanta-Foxconn planning to set up fabs in India,** these projects are expected to generate **1 lakh direct jobs in the coming years.**
- A robust semiconductor ecosystem can boost India's startup ecosystem, particularly in hardware development. **MSMEs, which contribute 30% to India's GDP**, can benefit from affordable chips for consumer electronics, boosting their competitiveness.
- For example, startups like **Saankhya Labs are already innovating in the semiconductor space**, showcasing India's potential for indigenous chip design.

➢ **Ensuring Supply Chain Resilience:** The global chip shortage during the **Covid-19 pandemic** exposed vulnerabilities in India's electronics and automotive sectors.
- By investing in domestic semiconductor production, India can shield its industries from external disruptions.
- For example, the **automotive industry lost $110 billion globally in 2021 due to chip shortages,** with Indian carmakers facing delayed production cycles.

➢ **Strengthening Technological Sovereignty:** Semiconductors are essential for technological innovation in **AI, IoT, and quantum computing**, all critical for maintaining technological sovereignty.
- Countries like the **US and EU are heavily investing in chip production** to reduce reliance on Chinese supply chains.
- India has launched the **Digital India RISC-V program** and partnerships with entities like **Micron Technology**, which has committed to a $2.75 billion facility in Gujarat.

➢ **Promoting Green Technology and Renewable Energy:** Semiconductors are key components in green technologies like **solar panels, electric vehicles (EVs), and smart grids.**
- Domestic semiconductor production can accelerate India's renewable energy goals.
- For instance**, India aims to achieve 500 GW of non-fossil fuel capacity by 2030,** and chips are essential for solar inverters and EV batteries.
- The number of power semiconductors used in the global renewable energy markets is expected to grow with a compound annual growth rate (CAGR) of **8% to 10% from now to 2027.**

➢ **Enhancing National Security and Cybersecurity:** Semiconductors are critical for advanced **defense technologies, including missile systems, drones, and secure communication networks.**
- Dependence on foreign chips poses risks of espionage and cyber vulnerabilities. India has launched **DRDO-led initiatives to develop indigenous chips for strategic sectors**, ensuring self-reliance in defense electronics.
- DRDO has recently commissioned a **Bangalore-based firm to indigenously develop a receiver chip** to acquire and disseminate **Indian time for Navigation.**

What are the Key Issues Hindering the Progress of India's Semiconductor Sector?

➢ **High Capital Costs and Limited Financial Backing:** Semiconductor manufacturing requires massive capital investments, with **fabs costing upwards of $10 billion each,** creating significant barriers for India.
- For instance, Micron Technology's facility in Gujarat received $2.75 billion in funding but **requires consistent financial commitment** over the next decade to sustain operations.
- Globally, countries like the **US have allocated $53 billion under the CHIPS Act, dwarfing India's budget.**

➢ **Lack of Skilled Workforce:** Semiconductor fabrication demands highly specialized expertise in areas like **nanotechnology, material science, and process engineering,** which India currently lacks at scale.
- While India has a **strong semiconductor design workforce (20% of global share), fabrication and packaging talent remains minimal**.
- Also, the semiconductor industry faces a potential skill gap of **250,000 to 300,000 professionals by 2027,** that is a cause of concern.

➢ **Weak Infrastructure and High Energy Demand:** Semiconductor fabs require advanced infrastructure, including **uninterrupted power, water, and cleanroom environments,** which are limited in India.
- **A single fab can consume as much electricity annually as a small city** and up to **10 million gallons of ultrapure water daily.**
- For example, the **Vedanta-Foxconn project faced delays due to inadequate water and power supply chains.**
  - In contrast, **Taiwan provides renewable energy support to its semiconductor** hubs, ensuring operational efficiency.

➢ **Insufficient R&D Ecosystem:** India's semiconductor ambitions are hindered by the lack of a robust R&D ecosystem to develop indigenous chip technology.

- Most of India's semiconductor capabilities are focused on **chip design, leaving manufacturing and material research** reliant on imports.
- According to a McKinsey report (2023), **India invests only 0.65% of its GDP in R&D compared to South Korea's 4.8%**.
- The absence of foundational research partnerships and university-industry collaboration further slows innovation.

- **Geopolitical Dependencies on Imports:** India is heavily dependent on imports for semiconductor equipment and raw materials like **silicon wafers, making its supply chain vulnerable to global disruptions.**
  - Over 75% of the world's semiconductor production is concentrated in East Asia, with **China being a dominant supplier of raw materials.**
  - The ongoing **US-China tech war** exposed these vulnerabilities, with India's electronics manufacturing suffering delays and increased costs.
  - In 2022, India imported semiconductors worth **$24 billion**, highlighting its import dependence.
- **Long Gestation Period and Low ROI:** The semiconductor industry operates on **a long gestation cycle**, with fabs taking **4–5 years** to become operational and even longer to achieve profitability.
  - Investors often hesitate due to the high initial costs and slow returns. For instance, the US-based Intel took nearly a decade to recover its fab investments, even with government support.
  - In India, **startups and MSMEs find it particularly challenging to invest in such long-term projects** without sustained subsidies and market guarantees..
- **Limited Role of Private Sector in Fabrication:** While India's **private sector is strong in software and design,** its role in semiconductor fabrication is minimal due to high costs and technical barriers.
  - **Most semiconductor initiatives are government-led**, with limited private investment in fab infrastructure.
  - For instance, companies like **Infosys and Wipro dominate chip design but have no presence in fabrication**.
  - In contrast, **Taiwan's semiconductor success stems from private giants like TSMC,** which have driven the industry with government support.
- **Fragmented Approach Across States:** India's federal structure leads to fragmented policies, with states competing rather than collaborating on semiconductor investments. States like **Gujarat, Karnataka, and Tamil Nadu** offer competing incentives, overshadowing other states and hindering **unified semiconductor hubs**.
  - In contrast, **China coordinates semiconductor development at a national level,** ensuring seamless integration of resources across regions.
- **Low Focus on Advanced Nodes:** India's semiconductor ambitions currently focus on **legacy and mature nodes (28nm and above),** which are insufficient for advanced technologies like **AI, quantum computing, and 5G.**
  - **Global demand is shifting toward advanced nodes like 5nm and 3nm,** with TSMC and Samsung leading this market.
  - Without investments in advanced node capabilities, India risks being limited to low-value segments of the semiconductor market.

What Measures can India Adopt to Strengthen its Semiconductor Ecosystem?

- **Enhancing Financial Incentives and De-risking Investments:** India should provide enhanced financial incentives, such as **tax breaks, subsidies, and low-interest loans, to attract semiconductor investors** while ensuring long-term viability.
  - A **dedicated Semiconductor Development Fund** could reduce risks associated with the long gestation period of fabs.
  - The US CHIPS Act ($52 billion) is a model India can emulate to offer a similar level of financial assurance.
- **Building a Skilled Workforce through Specialized Training:** Developing a skilled workforce for semiconductor design and fabrication is crucial. India can **establish specialized training centers** in collaboration with global leaders like **Taiwan Semiconductor Manufacturing Company (TSMC)** and **Samsung**.
  - Programs like the India Semiconductor Mission's aim to train 85,000 professionals should be expanded and linked to industry needs.
  - Offering scholarships in **nanotechnology and VLSI design through IITs and NITs** could address immediate skill gaps.
- **Fostering Public-Private Partnerships:** Strengthening PPPs can drive innovation and scale in India's semiconductor sector.
  - Private players can **focus on chip design and innovation** while the government handles large-scale fabrication facilities.

- For instance**, a model similar to TSMC's public-private synergy** could be implemented to streamline investments and operations.
- Collaborations like **Vedanta-Foxconn show promise** but need clearer frameworks to avoid delays in execution.

- **Investing in Semiconductor R&D Ecosystem:** India must establish semiconductor **R&D centers to foster innovation in materials, designs, and advanced nodes.**
  - Government grants and private funding should be allocated to create semiconductor-focused research hubs in collaboration with academic institutions.
  - For example, the **Digital India RISC-V (DIR-V) program** can serve as a platform for designing India's indigenous chips.
- **Improving Infrastructure for Fabs:** India must address infrastructure challenges such as **uninterrupted power supply, ultra-pure water availability, and cleanroom environments for fabs**.
  - Industrial clusters should be developed near semiconductor hubs, with states like **Gujarat and Karnataka** leading the way.
  - **Fast-tracking renewable energy projects for fabs,** akin to TSMC's solar-powered facilities, would reduce operational costs.
  - Government-supported infrastructure projects, such as **dedicated semiconductor parks, should be prioritized.**
- **Strengthening the Supply Chain for Raw Materials:** India should develop an indigenous supply chain for essential semiconductor materials like **silicon wafers and rare earth elements.**
  - Establishing tie-ups with countries like **Australia and Japan** for rare earth sourcing would reduce dependency on China.
  - **Investing in local production facilities for silicon wafers** and chemicals would strengthen resilience.
  - For example, **India's recent MoU with IEA on critical minerals** could focus especially on semiconductor raw materials.
- **Promoting Advanced Node Development:** India should invest in developing advanced **nodes (below 10nm)** to remain competitive in cutting-edge technologies like AI, quantum computing, and 5G.
  - Establishing advanced research labs **dedicated to smaller nodes**, supported by government funding, will ensure India's entry into high-value markets.
- **Creating a Semiconductor Export Hub:** India should position itself as an **export hub for semiconductors by leveraging its strategic location and cost-effective labor.**
  - Incentives should be provided to attract global companies to establish chip packaging, testing, and design facilities.
  - A **free trade agreement with technology-importing countries** could ensure preferential access to markets. .
- **Simplifying Regulatory Approvals and Bureaucratic Processes:** India needs to streamline its regulatory framework to **attract global semiconductor investments.** Setting up a single-window clearance system for semiconductor projects would reduce delays and improve investor confidence.
  - For example, the Vedanta-Foxconn project faced delays due to bureaucratic inefficiencies; **such issues must be resolved through transparent processes.**
  - Creating **National Semiconductor Task Force** to harmonize state and central efforts
- **Encouraging Domestic IP Development:** India must encourage the development of indigenous semiconductor intellectual property (IP) by **funding local startups and research institutions**.
  - Initiatives like the **"Chip-to-Startup" program can be expanded to focus on IP creation** for specific industries like automotive and IoT. Incentivizing patents through subsidies or grants can boost India's rank in global semiconductor IP filings.
- **Promoting Green and Sustainable Fabs:** To address environmental concerns, India must encourage semiconductor fabs to adopt green technologies**. Incentives should be provided for fabs using renewable energy** and advanced water recycling methods, similar to TSMC's approach.
  - Dedicated sustainability goals for semiconductor projects would align with India's net-zero emissions target by 2070. .
- **Encouraging State and Regional Collaboration:** Rather than competing for semiconductor investments, Indian states should collaborate to create a unified national semiconductor strategy.
  - Regional clusters like the **Bengaluru-Mysuru corridor or the Gujarat-Maharashtra cluster can specialize in design, packaging, and fabrication**.
  - Federal support through the Semiconductor Mission can harmonize state-level policies, avoiding duplication of efforts.
- **Leveraging India's Software Expertise:** India can integrate its global leadership in software with semiconductor hardware development to create a **comprehensive tech ecosystem**.
  - Combining chip design with AI and software solutions can drive demand for indigenous semiconductors.

Conclusion:

India's semiconductor mission holds **immense potential to transform the country into a global tech hub.** The government's continued support, coupled with private sector investment and technological innovation, will be crucial in realizing this ambitious goal. A successful **semiconductor ecosystem will not only strengthen India's digital economy but also elevate its strategic position in the global tech landscape.**

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Strengthening India's Electoral Democracy

This editorial is based on "Election Commission of India is one of the greatest gifts of the Constitution" which was published in The Indian Express on 25/11/2024. The article brings into picture the strengths and challenges of India's electoral system, highlighting the progress made by the Election Commission and judicial oversight, while emphasizing the urgent need for comprehensive reforms.

Tag: GS Paper - 2, Constitutional Bodies, Transparency & Accountability

India's electoral system, established by the **Constitution in 1949,** stands as a globally admired democratic framework. Despite being the **world's largest democracy**, the nation faces significant challenges including **political criminalization and systemic electoral vulnerabilities.** The Election Commission has made remarkable progress, particularly in **improving voter representation and electoral integrity.** Judicial oversight has been crucial in protecting democratic principles, most notably in recent **electoral bond rulings.** To truly evolve, India must urgently implement comprehensive electoral reforms.

How the Electoral System Evolved in India?

- Pre-Independence Era:
  - **Government of India Act, 1858:** British Crown assumed control; no representative governance.
  - **Indian Councils Act, 1861 & 1892:** Introduced limited participation of Indians in legislative councils but without electoral representation.
  - **Government of India Act, 1909 (Morley-Minto Reforms):** Introduced communal representation with separate electorates for Muslims.
    - Marked the first instance of limited form of electoral representation for Indians
  - **Government of India Act, 1919 (Montagu-Chelmsford Reforms):** Expanded the electorate to include property owners and taxpayers.
    - Introduced dyarchy, with partial Indian representation in provincial councils.
  - **Government of India Act, 1935:** Provided for **provincial autonomy and expanded electorates.**
- Post-Independence Era:
  - **Constituent Assembly Debates: Universal adult suffrage adopted as a fundamental principle and** ensured an inclusive, democratic process for elections.
  - Articles Governing Elections:
    - **Article 324**: Establishment of the Election Commission of India (ECI) to oversee free and fair elections.
    - **Articles 325–329**: Enshrine the framework for elections, delimitation of constituencies, and prohibition of discrimination.
- Key Developments in the Electoral System:
  - **Initial General Elections (1951-52):** First democratic elections held with **universal adult suffrage**.
    - Over 173 million voters participated; **85% were illiterate,** necessitating innovative measures like **symbols for parties**.
  - **Institutional Strengthening of ECI:** Initially, the commission consisted of only a Chief Election Commissioner.
    - In **1989, ECI became a multi-member body.**
    - It briefly reverted to a single-member body in **1990**, but since 1993, it has been functioning as a **three-member body (one Chief Election Commissioner and two Election Commissioners).**
  - **Reduction of Voting Age:** The **61st Constitutional Amendment Act, 1989**, lowered the voting age from **21 to 18 years**, enabling youth participation in the electoral process.
  - **Right to Information Act (2005):** Brought political parties under public scrutiny.
    - The Supreme Court in 2020 ordered **political parties to publish the entire criminal history of their candidates** for Assembly and Lok Sabha elections.
  - Technological Integration:
    - **1989**: Provision for **Electronic Voting Machines**(EVM) was made.
    - **2011**: Prototype of Voter-Verifiable Paper Audit Trail (VVPAT) was developed to enhance transparency and used for the first time in 2013.

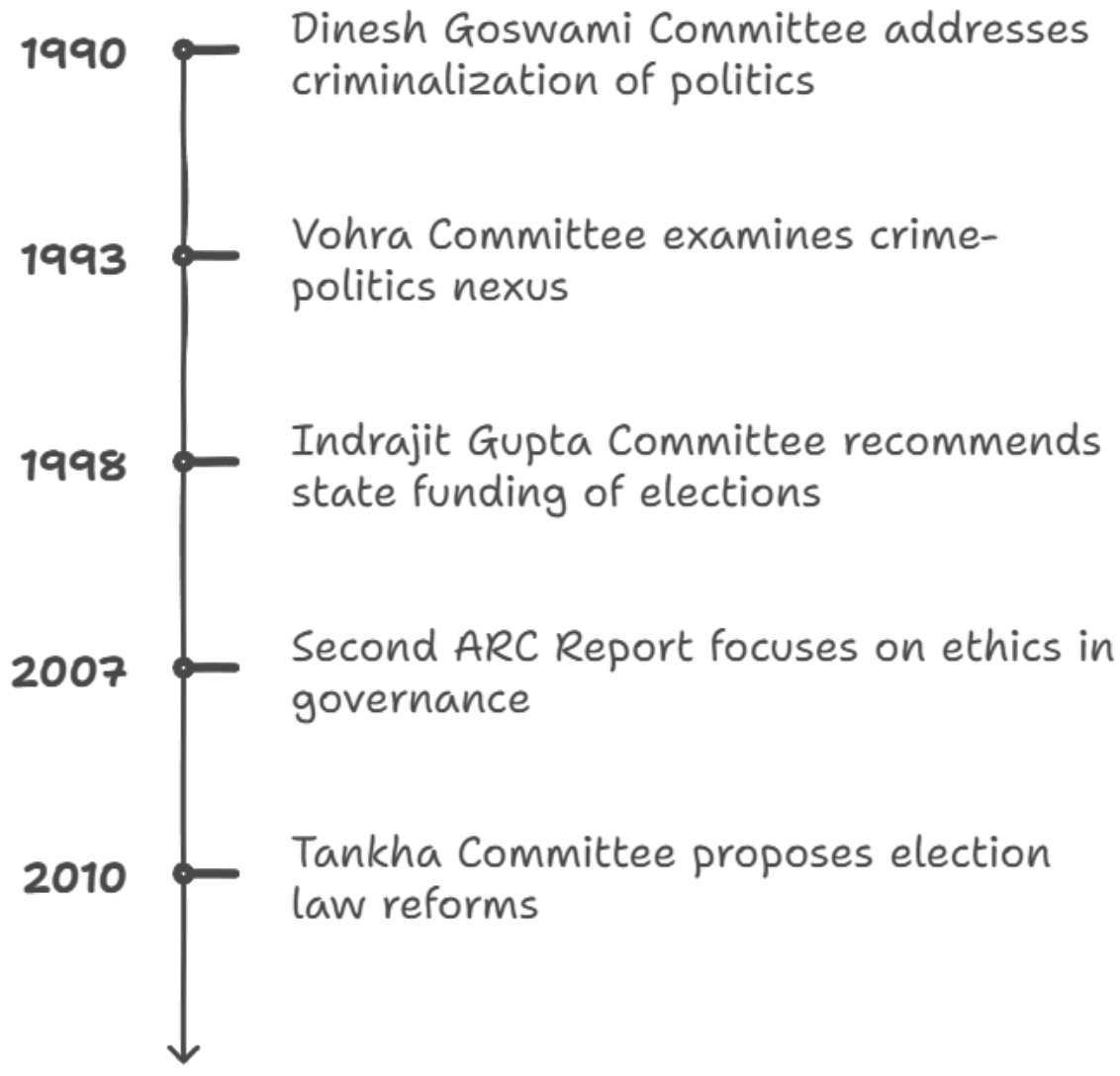
- **Introduction of None of the Above (NOTA):** In **2013**, following a Supreme Court directive, the **NOTA** option was introduced in EVMs, allowing voters to abstain from choosing any candidate while maintaining ballot secrecy.
- **Model Code of Conduct (MCC):** Originating in Kerala (1960), the MCC was expanded by **1979** with the participation of political parties.
  - **T.N. Seshan's tenure (CEC)** is noted for strict enforcement of the MCC and the introduction of **Electors' Photo Identity Cards (EPICs)** in **1993**.

What are the Key Issues Related to India's Electoral System?

- **Money Power in Elections:** Unchecked use of money in elections undermines the principle of free and fair elections.
  - **Political parties and candidates often rely on unaccounted funds,** leading to opaque financing and increasing the influence of corporations and the wealthy.
  - Almost **60% of the funds received by political parties** cannot be traced and come from "unknown" sources, including electoral bonds, according to a report by the **Association for Democratic Reforms (ADR).**
    - Electoral bonds have accounted for more than **Rs 16000 crore worth funds** contributed to various political parties so far.
  - The Supreme Court recently held that the **Electoral Bond Scheme was unconstitutional for violating the right to information of voters.**
- **Criminalization of Politics:** The rising number of candidates with criminal backgrounds erodes public trust in governance.
  - Parties prioritize **winnability over integrity,** often fielding candidates with serious charges.
  - A 2024 report by ADR reveals that **251 (46%) of the 543 newly elected Lok Sabha members have criminal cases** registered against them, **with 27 having been convicted**. This marks the highest number of elected candidates with criminal charges.
  - The **Supreme Court's directive to publish criminal records** has had limited impact due to weak enforcement.
- **Low Voter Turnout:** Voter apathy, especially in urban areas, remains a **persistent issue,** affecting the legitimacy of the electoral process.
  - **Lack of awareness, logistical challenges, and alienation from politics** deter participation.
  - For instance, **Phase 3 of the Lok Sabha election 2023 saw a 2.9% drop in voter turnout** compared to 2019. Urban constituencies like Bengaluru have turnout as low as **54%.**
- **Electoral Violence and Intimidation:** Physical intimidation and violence disrupt the democratic process in several states, particularly in rural and conflict-prone regions.
  - This deters free expression of voter choice and compromises fairness.
  - For example, Violence reported in **West Bengal** during the **sixth phase of Lok Sabha elections** 2024.
- **Misuse of Media:** The misuse of media for propaganda and the spread of misinformation polarize the electorate and distort democratic discourse.
  - **Paid news and the lack of regulatory mechanisms** exacerbate this problem.
  - Nearly **80% of India's first-time voters** find themselves bombarded with fake news on popular social media platforms, according to a survey.
  - **Deep Fake videos** of **Manoj Tiwari** were used to boost voter outreach.
- **Election Commission's Independence:** Questions about the autonomy and impartiality of the Election Commission (EC) have emerged **due to perceptions of bias and delayed action against violations.**
  - The Supreme Court in 2023 mandated a **selection committee for the Chief Election Commissioner** to ensure greater independence. However, the effectiveness of these measures remains to be seen.
  - Election Commissioner **Arun Goel resigned just days before the expected announcement of the 2024 Lok Sabha election schedule**, has raised suspicions.
- **EVM Reliability and VVPAT Implementation:** Despite assurances from the EC, doubts about EVM tampering persist, especially among opposition parties.
  - Reports indicated EVM malfunctions in states like Assam, where approximately **150 EVMs** were replaced due to technical issues
  - The **limited use of VVPAT paper trails** in counting further fuels suspicion.
- **Gender Representation Gap:** The underrepresentation of women in legislative bodies reflects a structural bias in candidate selection.
  - Women make up **only 13.6% of the Lok Sabha (2024). Nari Shakti Vandan Adhiniyam will be implemented only after 2029** showing the slow pace of political reform.

- **Frequent Elections and Model Code of Conduct:** The cycle of frequent elections across states leads to governance paralysis as the **Model Code of Conduct restricts decision-making and policy implementation.**
  - This also strains resources, with simultaneous elections proposed as a potential solution.
  - The **2019 Lok Sabha elections, spread over seven phases, cost ₹60,000 crore,** highlighting the logistical and financial burdens of fragmented elections.
- **Vote-Buying and Freebie Culture:** Distribution of **cash, liquor, and other inducements** compromises the sanctity of elections and leads to poor governance outcomes.
  - The **Election Commission of India** reported record seizures of over **Rs 1,000 crore in Maharashtra and Jharkhand** during **the recent assembly bypolls,** seven times higher than in 2019.
    - The haul included cash, precious metals, drugs, liquor, and freebies, with Maharashtra leading in seizures.
  - Moreover, the promise of unsustainable freebies, such as the **"revdi culture"**, shifts focus away from sustainable development policies.

Key Committees on Electoral Reforms:



- **Lack of Inner-Party Democracy:** Political parties often lack transparency and internal democracy, leading to centralized decision-making and dynastic politics.
  - Presently, there is **no statutory backing for internal democratic regulation of political parties in India** and the only governing provision is under **Section 29A of the Representation of the Peoples' Act, 1951.**

- This curtails opportunities for **grassroots leaders and weakens accountability**. For instance, **30% of 2019 Lok Sabha MPs belonged to political families,** reflecting the entrenched nature of dynastic politics in India

- **Disenfranchisement of Migrant Workers:** Millions of internal migrants are effectively disenfranchised as they are unable to vote in their home constituencies due to logistical and legal barriers.
  - The EC's proposal to introduce **Remote Voting Machines (RVMs)** has faced criticism for feasibility issues.
  - According to Census 2011, India has over **450 million internal migrants,** many of whom remain unrepresented.
- **Mismanagement of Delimitation:** Delimitation exercises, **frozen since 1976** to maintain parity in representation, have created significant imbalances in representation.
  - States like Uttar Pradesh and Bihar have a **disproportionately higher number of seats compared to those like Kerala or Tamil Nadu**, which have successfully implemented population control measures.
- **Neglect of Environmental Costs in Campaigning:** The environmental impact of large-scale campaigning, including rallies and posters, remains unaddressed.
  - Plastic waste generated during elections has become a significant concern. For instance, the EC launched the 'Eco-Friendly Election Campaign' initiative in 2023 to minimize this impact, but compliance has been minimal.

What Measures can be Adopted to Enhance India's Electoral System?

- **Addressing Criminalization of Politics:** There's an urgent need for strict provisions for candidates with serious criminal charges from contesting elections unless cleared by a fast-track court.
  - Strengthen the enforcement of the Supreme Court's directive to publish criminal records prominently. The Representation of the People Act could be amended to ensure stricter eligibility criteria
- **Simultaneous Elections:** Conducting **simultaneous elections for the Lok Sabha and state assemblies** can reduce logistical challenges and financial costs while minimizing governance disruption due to frequent polls as advocated by **Kovind Committee.**
  - This would require constitutional amendments and synchronization of terms, but **it is achievable through political consensus.**
  - Implementation could involve pilot testing in select states before nationwide rollout.
- **Improving Voter Turnout:** Initiatives like **online voter registration and remote voting mechanisms** for migrants can address the disenfranchisement of large sections of the population.
  - The **EC's proposal for Remote Voting Machines (RVMs)** is a promising step but requires robust testing and safeguards.
  - Awareness campaigns, particularly targeting urban areas with low voter turnout, can enhance participation.
- **Strengthening the Independence of the Election Commission (EC):** Ensure **financial autonomy for the EC to prevent executive interference.**
  - Address allegations of bias through **regular performance audits by independent bodies.**
  - The **EC's credibility, questioned in 2019 Lok Sabha elections, can be bolstered through such reforms.** Institutional accountability mechanisms are essential for maintaining trust.
- **Mandatory Inner-Party Democracy:** Enforce **internal elections within political parties** to select candidates and leaders, ensuring transparency and accountability.
  - Amend the Representation of the People Act to include **penalties for non-compliance, such as deregistration of parties**.
  - The Election Commission can mandate regular audits of party functioning. **Incentivizing compliant parties** through additional public funding can promote this reform.
- **Regulating Digital Campaigning and Social Media:** Introduce stringent regulations to **curb misinformation and paid news on digital platforms during elections.**
  - Platforms like **WhatsApp and Facebook** should be mandated to flag and remove fake news promptly.
  - Creating an **EC-supervised fact-checking unit** can address this challenge. Transparency in digital ad expenditure must be enforced to ensure accountability.
- **Expanding VVPAT Coverage:** Ensure VVPAT slips verification for at least **5% of EVMs as upheld by the Supreme Court to bolster trust in electronic voting.**
  - Increasing coverage, while resource-intensive, can enhance credibility in the system.
  - Public awareness campaigns about **VVPAT processes can counter doubts about EVM reliability.**
- **Combating Freebie Culture:** Establish guidelines **for electoral promises, distinguishing legitimate welfare measures from unsustainable freebies.**

- The EC can mandate parties to provide a fiscal roadmap for their promises.
- Parties promising **unsustainable schemes should face public accountability through mandatory disclosures**. Educating voters about the long-term impacts of freebies is equally crucial.

➢ **Enhancing Security in Conflict Zones:** Deploy advanced surveillance and increased **paramilitary forces to ensure free and fair elections** in conflict-affected areas.
- Improved logistical planning, such as **mobile polling booths, can enhance voter participation** in insurgency-hit regions.
- Partnerships with local communities to build trust can improve turnout. Independent observers can monitor sensitive zones to prevent malpractices.

➢ **Promoting Environmental Sustainability in Campaigns:** Mandate **eco-friendly practices like digital campaigning, biodegradable posters**, and paperless voting mechanisms.
- Large-scale rallies generate significant plastic waste, undermining environmental goals. Incentives for parties adopting sustainable practices can drive change.
- Collaborating with **NGOs for clean-up drives post-campaigns can further reduce environmental impact.**

Conclusion:

Strengthening India's electoral democracy requires a comprehensive approach, addressing systemic flaws like **criminalization, voter apathy, and misuse of resources.** Reforms such as enhancing the **Election Commission's independence, promoting inner-party democracy, and leveraging technology are crucial**. A transparent and inclusive electoral process is vital to uphold democratic integrity. India's commitment to reform can set a global benchmark for vibrant democracies.

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Tackling Poverty: A Multi-Dimensional Challenge

This editorial is based on "The good, the bad, and the ugly in poverty alleviation" which was published in Hindustan Times on 28/11/2024. The article brings into picture the "graduation approach" to poverty alleviation, which integrates social protection, empowerment, financial inclusion, and livelihood promotion. Despite its promise, India faces persistent challenges in addressing widespread poverty.

Tag: GS Paper - 2, Poverty, Issues Relating to Poverty & Hunger, GS Paper - 3, Growth & Development

India is embracing an innovative **poverty alleviation** strategy known as the **"graduation approach",** pioneered by Bangladesh Rural Advancement Committee (BRAC) and successfully implemented in 50 countries. This method goes beyond traditional cash handouts, focusing on comprehensive support for ultra-poor families through **social protection, empowerment, financial inclusion, and livelihood promotion.** However, despite these promising initiatives, India still has a long way to go in effectively addressing its widespread poverty challenges.

What is the History of Poverty Estimation in India?

➢ **Pre-Independence Period:**
- **Dadabhai Naoroji's Poverty Line (1867): Dadabhai Naoroji,** in his seminal work ***"Poverty and the Un-British Rule in India"***, made one of the earliest estimates of poverty in India.
  - He formulated a poverty line based on the minimum subsistence requirements, estimating it to range between **Rs. 16 to Rs. 35 per capita per year at 1867-68 prices.**
  - His methodology primarily focused on the cost of basic food, clothing, and shelter necessary for survival.
- **National Planning Committee (1938):** Formed by **Subhash Chandra Bose.**
  - Recommended a minimum standard of living.
  - In **1944**, the **Bombay Plan** suggested a poverty line of **Rs 75 per capita per year.**

➢ Post-Independence Period:
- **First Official Attempt (1962):** Working Group of the Planning Commission defined poverty in terms of consumption expenditure.
  - The Working Group recommended a minimum monthly consumption expenditure of **Rs. 100 per household (five persons or four adult units)** or Rs. 20 per capita, based on 1960-61 prices
- **Dandekar and Rath Committee (1971**): It was the first to systematically assess poverty in India. Led by **VM Dandekar and N Rath,** the committee utilized data from the National Sample Survey (NSS) for its analysis.
  - One of its key findings was that the poverty line should be defined based on expenditure that ensures a **daily intake of 2,250 calories in both rural and urban areas**.

- For rural regions, the minimum amount required to meet basic nutritional needs was determined to be **Rs 17.**

❍ **Alagh Committee (1979):** The committee established poverty lines for rural and urban areas based on **nutritional requirements** and associated consumption expenditure.

- It proposed updating poverty estimates by adjusting for **inflation**, setting the foundation for future methodologies.

❍ **Lakdawala Committee (1993):** The committee continued using **calorie-based poverty estimation** and developed **state-specific poverty lines**, updated using CPI-IW (urban) and CPI-AL (rural).

- It discontinued the practice of scaling poverty estimates using **National Accounts Statistics**.

❍ **Tendulkar Committee (2009):** This committee shifted from **calorie-based** estimation to a **broader consumption basket**, including health and education expenses.

- It introduced **uniform poverty lines** for rural and urban areas, using **MRP-based estimates**, and set the 2004-05 poverty line at **₹446.68 (rural) and ₹578.80 (urban),** equivalent to **₹33/ day in PPP terms.**

❍ **Rangarajan Committee (2014):** The committee used **large household surveys** and set poverty thresholds at ₹32/day (rural) and ₹47/day (urban), based on **normative nutritional and behavioral standards**.

- However, the government rejected the recommendations of this committee, and Tendulkar's committee's recommendations still serve as the benchmark.

➢ Modern Developments:

❍ **Multidimensional Poverty Index (MPI):** Introduced in 2010 by UNDP and Oxford Poverty and Human Development Initiative.

- India has **adopted MPI to capture non-income-based poverty dimensions** such as education, health, and standard of living.

❍ **Periodic Labour Force Surveys (PLFS):** Provide data for updated poverty assessments, focusing on income and employment.

What is the Current Status of Poverty in India?

➢ **Status**: India has registered a significant decline in multidimensional poverty in India from **29.17% in 2013-14 to 11.28% in 2022-23** i.e. a reduction of 17.89 percentage points.

❍ Still, almost **129 million Indians** are living in extreme poverty in **2024**, on less than **$2.15 (about Rs 181) a day.**

➢ **Rural vs. Urban Disparity:** The poverty headcount ratio dropped significantly in rural areas, from 32.59% to 19.28%, while urban areas saw a decline from 8.65% to 5.27%.

❍ This reduction indicates a p**ro-poor bias, with rural areas witnessing a faster decline in poverty levels.**

➢ **Key Indicators Driving Progress**: Improvements in **nutrition, schooling, sanitation, and access to cooking fuel** contributed most to the reduction in multidimensional poverty.

❍ Deprivations in sanitation and cooking fuel fell by **21.8%** and **14.6% points**, respectively.

➢ **State-Level Achievements**: States like Bihar, Uttar Pradesh, Madhya Pradesh, Odisha, and Rajasthan recorded the steepest reductions in poverty.

❍ Uttar Pradesh alone saw **3.43 crore people** escape poverty, the highest among states.

Why Poverty as a Critical Concern in India Despite Progress?

➢ **Rising Inequality Amid Growth:** India's economic growth has disproportionately benefited the wealthy, leading to persistent inequality.

❍ According to the **World Inequality Report 2022,** India is among the most unequal countries in the world, **with the top 10% and top 1% of the population holding 57% and 22% of the total national income** respectively. The share of the bottom 50% has gone down to 13%.

➢ **Employment Crisis and Informal Sector Vulnerability:** Unemployment and underemployment, particularly in the informal sector, remain significant contributors to poverty.

❍ Despite a rebound in **GDP post-COVID-19**, CMIE data (2023) shows India's unemployment rate hovering **around 7-8%,** with urban areas faring worse.

❍ Additionally, **80% of the workforce in the informal sector lacks job security,** social benefits, and fair wages, perpetuating poverty cycles.

➢ **Rural Poverty and Agricultural Dependency:** Agriculture employs **46% of India's workforce but contributes only 18% to GDP**, reflecting **low productivity and disguised unemployment.**

- Despite initiatives like PM-KISAN, **farmer incomes remain inconsistent due to price volatility and climate risks.**
- As high as **70% of rural households still depend primarily on agriculture** for their livelihood, with 82 percent of farmers being small and marginal

➢ **Urban Poverty and Slum Proliferation:** Rapid urbanization has created urban poverty hubs with **poor access to housing, sanitation, and employment opportunities**.

- Census 2011 reported **17% of the urban population living in slums,** and this figure has only increased since then.
- The **World Bank (2023)** warns that **urban poor are disproportionately affected by inflation and environmental shocks**, exacerbating vulnerabilities.

➢ **Health Inequalities and Financial Strain:** Health-related poverty is a critical issue, with **out-of-pocket expenses accounting for 58.7% of healthcare spending.**

- Even with Ayushman Bharat, millions lack access to quality care, and catastrophic health expenses push families into poverty.
- Rural areas and marginalized groups face the **greatest burden, with maternal mortality rates and malnutrition still alarmingly high.**

➢ **Education and Skills Gaps:** Educational inequities **deepen poverty as millions remain outside the formal schooling system.**

- According to the World Bank report, India's learning poverty rate was at 56.1% pre-pandemic. According to the Annual Status of Education Report 2022, 80% of students in Grade 3 in schools in rural India could not read a Grade 2 text
- The **lack of skill alignment with industry demands exacerbates unemployment and reduces economic mobility,** perpetuating cycles of poverty across generations.

➢ **Climate Vulnerabilities Amplify Poverty:** Climate change disproportionately impacts the poor, who are **more reliant on climate-sensitive sectors like agriculture and fishing.**

- Extreme weather events have increased in frequency, with about **51% of children in India are living under the dual impacts of poverty and the climate emergency,**
- Cyclone Amphan **(2020) displaced over 2.4 million people, mostly in West Bengal,** illustrating the precarious position of India's vulnerable populations.

➢ **Regional Disparities in Development:** Economic development is uneven across states, exacerbating poverty in lagging regions.

- States like Kerala have significantly lower poverty rates (below 5%), while states like **Bihar continue to struggle with over 25% of their population living in poverty.**

What Strategies can be Implemented to Address Poverty More Effectively?

➢ **Enhancing Access to Quality Education:** Universal access to **quality education, particularly for marginalized groups,** can break intergenerational poverty cycles.

- Strengthening existing schemes like **Samagra Shiksha Abhiyan with a focus on digital infrastructure** and teacher training is crucial.
- For example, **bridging the digital divide through affordable internet and devices** can address gaps revealed during the Covid-19 pandemic.
- The New Education Policy 2020 emphasizes **skill-based learning,** but its implementation must prioritize rural and disadvantaged areas.

➢ **Promoting Livelihood Diversification in Rural Areas:** Dependence on agriculture, must be **reduced by diversifying rural livelihoods**.

- Strengthening **MGNREGA with skill-based projects** and integrating it with rural entrepreneurship schemes can create sustainable incomes.
- Programs like Start-up Village Entrepreneurship Programme **(SVEP) under** DAY-NRLM can provide support for small-scale rural businesses.
- Expanding **agricultural value chains and promoting allied sectors** like dairy and fisheries can further boost rural incomes.

➢ **Strengthening Social Safety Nets:** Effective social protection systems are essential to cushion the poor against economic shocks.

- **Expanding the scope and efficiency of** direct benefit transfer **(DBT) mechanisms** under schemes like **PM-KISAN and Ayushman Bharat** is critical. Introducing unemployment insurance for informal workers and universalizing access to PDS with better targeting can reduce vulnerabilities.

➢ **Universalizing Financial Inclusion:** Improving access to affordable credit, insurance, and banking services can empower the poor economically.

- Expanding the Pradhan Mantri Jan Dhan Yojana with financial literacy drives and linking it with **microfinance institutions (MFIs)** can support small businesses.
- Strengthening **NABARD initiatives to provide low-interest loans** for rural households can reduce dependence on informal moneylenders. RBI's recent focus on financial digitalization must prioritize rural and underserved areas to ensure equitable growth.

➢ **Skill Development and Employment Generation:** Skill development aligned with market demands is key to reducing unemployment and underemployment.

- Revamping the Pradhan Mantri Kaushal Vikas Yojana **(PMKVY) with localized, industry-specific training programs** can increase employability, Kerala's strides in education can serve as model.
- Promoting labor-intensive industries like **textiles, construction, and manufacturing under** Make in India can create jobs for the low-skilled workforce.
- Encouraging apprenticeship models and public-private partnerships for skill development can enhance outcomes.

➢ **Addressing Hunger and Malnutrition:** Tackling hunger requires ensuring the availability and affordability of nutritious food.

- Strengthening the Public Distribution System **(PDS) with fortified staples** and streamlining **Aadhaar-linked delivery can improve outcomes.**
- Initiatives like Poshan Abhiyan **should focus on targeted interventions for high-burden districts**.
  - Odisha's nutrition program can serve as model
- Promoting community kitchens and mid-day meal programs can address immediate nutritional gaps among children and pregnant women.

➢ **Empowering Women and Marginalized Groups:** Empowering women through economic and social initiatives can have **multiplier effects on poverty alleviation.**

- Expanding access to credit under schemes like **Stand Up India and enhancing SHG networks** under **DAY-NRLM can enable women to start businesses**.
- Addressing gender gaps in labor force participation is crucial for equitable growth. Introducing **mandatory gender budgeting across states** can ensure sustained investment in women-focused programs.

➢ **Climate-Resilient Development:** Promoting climate-resilient livelihoods can mitigate the impact of climate change on the poor, especially in agriculture.

- Expanding **crop insurance under** PM Fasal Bima Yojana with better coverage and timely payouts can safeguard farmer incomes.
- Encouraging **solar energy and agroforestry** through incentives can diversify rural incomes while preserving the environment.
- Policies promoting water conservation, like the **Jal Shakti Abhiyan,** must be scaled up in drought-prone regions.

➢ **Fostering Micro, Small, and Medium Enterprises (MSMEs):** MSMEs are crucial for employment generation and economic inclusivity, particularly for low-skilled workers.

- Strengthening MSME credit access through schemes like Emergency Credit Line Guarantee Scheme **(ECLGS)** and incentivizing startups in rural areas can boost employment.
- Promoting digital platforms to connect MSMEs with global markets can enhance profitability and resilience.
- The **MSME sector** can significantly uplift marginalized communities with focused policy support

➢ **Integrated Urban-Rural Development Policies:** Balanced development policies can reduce migration-driven poverty by creating opportunities in rural areas while addressing urban slum issues.

- Expanding the One District, One Product **(ODOP) initiative with integrated rural enterprise zones** can generate jobs locally.
- Developing **satellite towns with affordable housing** and industrial hubs can decongest urban centers while providing employment to migrants.
- Effective coordination between urban and rural development ministries can make this possible

➢ **Enhancing Digital Literacy and Access:** Digital exclusion limits the economic opportunities of the poor, particularly in rural and remote areas.

- **Expanding BharatNet to provide high-speed internet to all gram panchayats** and launching massive digital literacy drives can bridge this gap.
- **Linking rural entrepreneurs and workers to online platforms can provide market access,** financial services, and e-learning. Successes like the e-Shram portal for informal workers show how digital tools can integrate the poor into the economy.

- **Promoting Renewable Energy Access for the Poor:** Affordable and reliable energy access can significantly improve the quality of life and productivity of the poor.
  - Scaling up programs like **PM Kusum Yojana to provide solar energy solutions for small farmers** can reduce costs and improve irrigation.
  - Promoting **rooftop solar projects in low-income urban housing** through subsidies can ensure affordable electricity.
- **Developing Region-Specific Poverty Strategies:** India's poverty challenges are region-specific, requiring tailored interventions.
  - For example, **flood-prone states like Assam need robust flood-resilient infrastructure**, while **drought-prone areas in Rajasthan need enhanced water conservation programs** under the Jal Shakti Abhiyan.
  - Tribal-dominated regions require special focus on **land rights, education, and healthcare access.**
  - **NITI Aayog's Aspirational Districts Program** should focus on hyper-local challenges for maximum impact.
- **Encouraging Public-Private Partnerships (PPPs) in Welfare Delivery:** PPPs can enhance the efficiency and reach of welfare programs by leveraging private sector expertise.
  - Private entities can **complement government initiatives in education, healthcare, and skilling through CSR programs.**
  - It can also drive innovative approaches such as **AI in welfare delivery, blockchain for DBT transparency**
  - Successful PPP models like the **Akshaya Patra Mid-Day Meal Program demonstrate how private participation can improve outcomes**. Expanding PPPs in low-income housing and sanitation projects can accelerate poverty reduction.

Conclusion:

India has made significant strides in poverty reduction, particularly in **reducing multidimensional poverty (SDG 1).** However, persistent challenges such as inequality, unemployment, and lack of access to basic services remain. A multi-pronged approach is needed to address the root causes of **poverty, including strengthening social protection, promoting inclusive growth, and investing in human capital.**

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Empowering India Through Sports

This editorial is based on "Make sports integral to school education" which was published in Hindustan Times on 28/11/2024. The article brings into picture the transformative role of sports in shaping an aspirational India, emphasizing its integration into education to nurture vital life skills. By fostering talent through inclusive programs and school-based infrastructure, it envisions a more competitive and united nation.

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

In an **aspirational India**, **sports** must transcend mere **extracurricular activity and become an integral part of our educational ecosystem,** nurturing life skills that academic learning alone cannot provide. Champions like **Abhinav Bindra** emphasize that sports teach invaluable lessons of resilience, teamwork, and handling pressure, which are critical for personal and national growth.. The stories of young achievers like **para-athlete Kumari Jyothi** demonstrate tha**t sports can be a powerful equalizer, offering pathways to excellence for children across different abilities and social strata**. By embedding sports into our educational and social fabric, we can build a **stronger, more united, and globally competitive India.**

What Role Can Sports Play in Advancing India's National Development?

- **Enhancing Public Health and Productivity:** Sports promote physical fitness, reducing the prevalence of **lifestyle diseases such as diabetes and hypertension,** which cost India **₹6 trillion annually**.
  - Sports reduce **stress, depression, and anxiety, promoting mental well-being** in an increasingly urbanized and digitalized society.
  - The **Fit India Movement (2019)** is an example of a government initiative encouraging mass participation in fitness activities. I
    - **Improved public health decreases healthcare expenditures and enhances productivity,** contributing to economic growth.
- **Economic Growth Through the Sports Industry:** The sports industry, including **equipment, apparel, and media rights,** contributes significantly to GDP.
  - The Indian sports goods' market is estimated to grow to **$6.6 billion by 2027 from $ 3.9 billion in 2020-21**

- Mega-events like the **Indian Premier League attract foreign investments and boost tourism**, with the Board of Control for Cricket in India recording a **₹5,120 crore surplus from IPL 2023**.

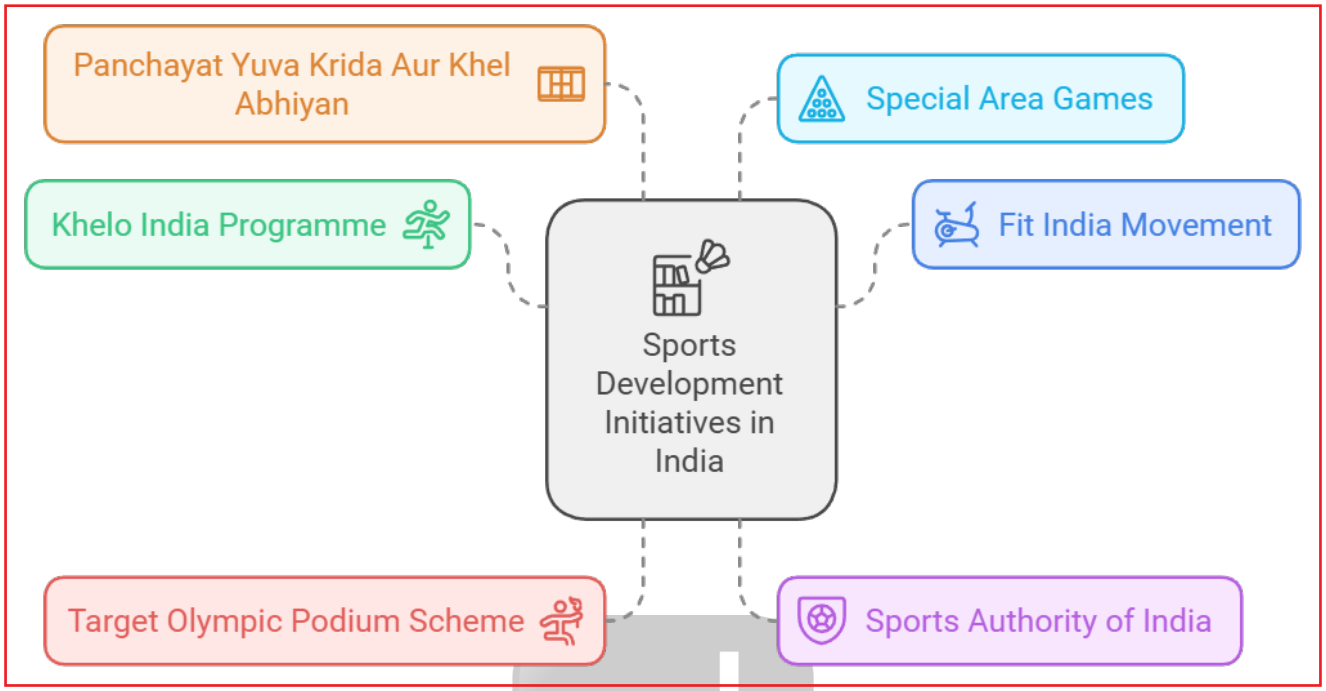
- **Fostering National Unity and Social Inclusion:** Sports serve as a unifying force, transcending barriers of **caste, religion, and region.**
  - Events like the **Cricket World Cup and Olympic victories** instill collective pride and patriotism.
  - For example, **Neeraj Chopra's gold medal at the Tokyo Olympics (2021)** and **India's T20 World Cup 2023** victory brought the nation together and highlighted India's talent on the global stage.
- **Strengthening Gender Equality:** Sports empower women by challenging stereotypes and providing a platform for success.
  - Female athletes like **PV Sindhu, Manu Bhaker and Nikhat Zareen** have inspired millions.
  - The **women cricketers are paid the same match fee as their male counterparts** highlighting the gender pay parity.
  - Programs like **Khelo India Women's Leagues** are fostering female participation and bridging gender gaps.
- **Diplomatic and Soft Power Projection:** Sporting achievements enhance India's global image, bolstering soft power.
  - For example, during the **India-Australia Test series,** the presence of the **Indian and Australian Prime Ministers** showcased the role of sports in fostering bilateral ties, while India's hosting of the **Chess Olympiad (2022)** demonstrated organizational excellence and promoted cultural diplomacy.
  - **Iran under-19 cricket coach** has requested the BCCI in 2023 to build the country's first stadium in Chabahar.
  - The **IPL 2020 in UAE** and **recent IPL auction held in Saudi Arabia** further highlights India's growing influence in global sports diplomacy.
- **Boosting Infrastructure Development:** Investment in sports infrastructure catalyzes broader economic benefits, especially in urban and semi-urban areas.
  - The **National Sports University in Manipur** and state-level stadium projects under Khelo India have created jobs and improved regional development.
  - For example, to establish **Odisha as a 'Sports Hub' nationwide,** the State Government has allocated **Rs 1315 crore for sports and youth services.**
- **Fostering Innovation and Technology Development:** Sports drive advancements in technology, including **wearable tech, AI-based training, and broadcasting solutions.**
  - Companies like **Cricbuzz and ESPN CricInfo** are revolutionizing sports news and culture. These innovations contribute to India's growing digital economy and employment generation.
- **Environmental Sustainability and Awareness:** Sports events are increasingly linked to sustainability, promoting eco-friendly practices.
  - In 2023, **Tata partnered up with the BCCI to plant 500 trees for every dot ball that was bowled** during the IPL playoffs and finals.
  - **M. Chinnaswamy stadium in Bengaluru** boasts a 400 kWp rooftop solar capacity on top of its eastern side stands.
  - By leveraging the reach of sports, India can advance environmental education and align with global sustainability goals like SDG-13 (Climate Action).
- **Reducing Crime and Antisocial Behavior:** Sports channelize youth energy into constructive activities, reducing their likelihood of engaging in crime or drug abuse.
  - Programs like the recent **National School Games in Jammu and Kashmir** have provided an alternative for at-risk youth, with a marked reduction in stone-pelting incidents.
  - Sports thus act as a **tool for rehabilitation and peace-building.** A former drug addict, **Pankaj Mahajan** now leads a team of ten football coaches under the **NGO Slum Soccer,** dedicated to uplifting communities.
- **Promotion of Indigenous Sports and Cultural Heritage:** Traditional sports like **Kabaddi, Kho-Kho, and Mallakhamb** preserve India's cultural identity and bring inclusivity to modern sports frameworks.
  - The Pro Kabaddi League (PKL) has revived interest in Kabaddi, with the **league valued at ₹100 crore per franchise**. Indigenous sports also showcase India's heritage to global audiences, enhancing cultural tourism.
- **Encouraging Entrepreneurial Ecosystems:** The sports industry stimulates entrepreneurship in areas like **apparel, fitness equipment, and sports-tech startups.**
  - Companies like **Cult.fit and Playo** have emerged as market leaders. Such ventures contribute to **India's booming startup ecosystem and create job opportunities.**

- **Breaking Stereotypes and Marginalization:** Sports challenge societal stereotypes, promoting inclusion for marginalized groups like tribals, Dalits, and people with disabilities.
  - Athletes like **Navdeep Singh,** a **Paralympic gold medalist,** have redefined perceptions of differently abled in India.
  - Policies like the **Draft National Sports Policy 2024 emphasize inclusivity**, funding infrastructure for para-sports and underserved communities.

What are the Key Issues Hindering the Development of Sports Culture in India?

- **Inadequate Infrastructure and Facilities:** The lack of quality sports infrastructure, particularly in rural areas, **hinders the development of grassroots talent**.
  - Many aspiring athletes face challenges such as poorly maintained facilities, limited equipment, and inaccessible training centers.
  - The **Standing Committee on Human Resource Development** observed that during **2018-19 and 2019-20,** the actual expenditure on the Khelo India scheme was Rs 324 crore and Rs 318 crore, respectively.
    - However, the estimated allocation was **Rs 520 crore and Rs 500 crore, respectively, highlighting the inefficiency in utilization of funds.**
- **Overemphasis on Academics over Sports:** India's cultural focus on academic achievement often sidelines sports, treating it as an **extracurricular rather than a career option.**
  - Parents and schools prioritize academic success over physical education, limiting participation in competitive sports.
  - According to a 2022 report by the **Ministry of Youth Affairs and Sports**, **less than 20% of Indian schools have sports facilities that meet the minimum required standards.**
- **Poor Governance and Bureaucratic Inefficiencies:** The functioning of sports federations in India is marred by **red tape, mismanagement, and lack of professionalism.**
  - Key positions in sports bodies are often occupied by politicians with little expertise, affecting decision-making and athlete welfare.
  - The **suspension of all payments to Indian Olympic Association (IOA) by the International Olympic Committee in 2022** for governance issues is a stark reminder of these systemic inefficiencies.
- **Gender Disparity in Sports Participation:** Women athletes face systemic challenges such as **inadequate training facilities, pay gaps, and societal stigma.**
  - Despite recent successes like **Neeraj Chopra and P.V. Sindhu**, gender parity in sports remains far from achieved.
  - According to a **UNESCO report (2024), 49% of adolescent girls drop out of sports, and 21% of women athletes have experienced sexual harassment.**
    - With women comprising 48.5% of the population (Women and Men in India 2022), the country cannot hope to achieve significant success in sports if nearly half of its population is excluded from participation.
- **Lack of a Structured Talent Identification System:** India lacks a streamlined system for identifying and nurturing talent at the grassroots level.
  - **Many talented athletes remain unnoticed** due to the absence of scouting mechanisms, particularly in rural and tribal areas.
  - **Tulsidas Balaram**, one of India's greatest football players during the golden era of Indian football, who was discovered only because a local coach happened to see him playing barefoot in a remote area.
    - His story highlights **how talent might get overlooked in the absence of structured systems** to identify potential athletes.
- **Dominance of Cricket Over Other Sports:** The overwhelming focus on cricket in India has led to the neglect of other sports.
  - This disparity reflects in **sponsorships, media coverage, and fan engagement,** creating an uneven playing field for non-cricketing disciplines.
  - For example, in 2021, **cricket accounted for 88% of national spending on sports revenue** in India, leaving minimal resources for other sports like hockey, badminton, or athletics.
- **Short-Term Approach to Sports Policy:** India's focus on short-term achievements rather than sustained growth has hindered the creation of a strong sports culture.
  - Celebrations of **individual achievements, such as Olympic medals, often overshadow the need for consistent investments** in grassroots development.
  - The **lack of a comprehensive, long-term strategy for preparing athletes** is reflected in India's underperformance in **Paris Olympics 2024.**

What are the Key Initiatives for Sports Development in India?



What Measures can be Adopted to Enhance Sports Culture in India?

- **Enhancing Grassroots Infrastructure:** The government should prioritize the development of sports infrastructure, especially in **rural and semi-urban areas, through public-private partnerships (PPPs).**
  - Initiatives like **mini-sports complexes in every block**, equipped with multi-disciplinary facilities, can ensure accessibility for all.
  - Emphasis should be laid on the **timely utilization of allocated funds under schemes like Khelo India.**
  - **Regular audits and transparent mechanisms** must be instituted to monitor fund usage and prevent inefficiencies.
- **Promoting Sports as a Viable Career Option:** Incorporate sports into the school curriculum with **equal weightage to academics and physical education,** backed by mandatory infrastructure.
  - Launch nationwide awareness campaigns showcasing the achievements of athletes in diverse sports to inspire youth.
  - **Offering scholarships, career counseling, and skill-based training** for retiring athletes will make sports an appealing career choice.
  - Incentivize schools and colleges that produce national and international-level athletes to create a pro-sports environment.
  - Bihar youngster **Vaibhav Suryavanshi,** just 13 years old has become the youngest player to earn an IPL deal, **worth INR 1.10 crore can inspire millions.**
- **Strengthening Governance in Sports Federations:** Introduce reforms mandating professional qualifications for sports administrators and eliminating undue political interference.
  - **Establish independent regulatory bodies** to oversee governance and ensure accountability in federations.
  - **Regular performance audits of sports** bodies and a whistleblower mechanism can improve transparency.
  - Following international governance benchmarks, as the **International Olympic Committee mandates,** should be a cornerstone of reform efforts.
- **Addressing Gender Disparity in Sports:** Set up **women-exclusive sports academies to ensure a safe and conducive environment** for training.
  - Increase funding for **women-centric sports programs** and provide financial incentives for female athletes.
  - Enforce **strict policies against harassment and discrimination**, along with fast-track grievance redressal mechanisms.
  - Promote campaigns to challenge stereotypes and showcase successful women athletes as role models to encourage participation at all levels.
- **Implementing a Structured Talent Identification System:** Launch a nationwide talent **scouting initiative**, leveraging school-level competitions and local tournaments in underserved regions.
  - **Establish partnerships with NGOs and local bodies to identify hidden talent,** especially in rural and tribal areas.

- **Create a database of potential athletes**, linked to specialized training academies equipped with advanced coaching and facilities.

- **Balancing the Focus Across Sports Disciplines:** Diversify sponsorship opportunities and p**rovide tax incentives for companies investing in non-cricket sports**.
  - Increase media coverage for diverse sports, particularly during international events like the **Olympics and Asian Games.**
  - Introduce a central sports broadcasting platform to highlight achievements in sports beyond cricket.
  - The government should also encourage **state-level leagues for sports like hockey, kabaddi, and athletics** to build fan bases and attract corporate investment.
- **Utilizing Technology and Digital Platforms:** Adopt advanced technologies like **AI-based performance analytics to improve training and scouting.**
  - Set up online portals for registering budding athletes, with access to resources such as e-coaching, training videos, and fitness tips.
- **Integrating Sports into Urban and Rural Development Policies:** Incorporate sports **infrastructure into urban planning policies,** ensuring open spaces are preserved for sports activities.
  - In **rural areas,** link sports development to employment generation schemes like **MGNREGA**, where building sports facilities can be included as an employment activity.
  - Offer subsidies for setting up sports academies in underserved regions to attract private sector participation.
- **Fostering a Holistic Sports Ecosystem:** Establish **sports science and medicine centers to provide athletes with world-class facilities** for injury management and performance enhancement.
  - Promote **research and innovation in sports equipment manufacturing** to make India a hub for affordable, high-quality sports gear.
- **Sports Tourism Development:** Encourage states to develop world-class sports tourism hubs by building **stadiums, sports museums, and training facilities that double as tourist attractions.**
  - Host international sporting events in underdeveloped regions to bring economic growth and inspire youth.
  - Promote adventure sports in areas like the **Himalayas or coastal regions, offering employment opportunities** and boosting the local economy.
  - **Link sports tourism to initiatives like "Incredible India**" to create global recognition for India's sporting potential.
- **Youth and Grassroots Talent Exchange Programs:** Collaborate with international sports federations for talent exchange programs, especially for **niche and Olympic sports.**
  - Enable young athletes to train abroad under renowned coaches and bring back advanced skills.
  - Similarly**, invite international experts to train Indian coaches and athletes domestically.**
  - **Government-to-government (G2G) partnerships** can facilitate scholarships for promising athletes to participate in global training camps and competitions.
- **Linking Sports to Health Policies:** Integrate sports promotion into public health campaigns to emphasize its role in **reducing lifestyle-related diseases like obesity, diabetes, and hypertension**.
  - Establish collaborations between the **Ministry of Youth Affairs and Sports and the Ministry of Health** to design programs encouraging physical activity in all age groups.
  - Conduct regular community-level fitness and sports camps to promote healthy living, with incentives for participation in competitive and recreational sports.
- **Creating Sports Incubators and Startups:** Support the establishment of **sports-focused startups through government-backed incubators.**
  - These startups can work on innovations like affordable training equipment, sports analytics, and fitness technology tailored for Indian athletes.
- **Sports into Workplace:** Incorporating sports into the workplace can play a pivotal role in improving mental health.
  - By organizing regular **physical activities, team sports events, and fitness challenges,** employers can reduce stress, boost morale, and enhance collaboration among employees.
  - Offering **incentives for participation and providing dedicated spaces for physical activity** can promote work-life balance and overall well-being.

Conclusion:

Integrating sports into India's education system and national development framework is vital for holistic growth. Sports can enhance **physical and mental well-being,** foster unity, promote gender equality, and serve as a tool for social inclusion. With strategic reforms, grassroots talent development, and inclusive policies, India can **unlock sports' transformative potential to build a healthier, more resilient, and globally competitive society**.

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Drishti Mains Questions

1. Discuss the objectives and expected outcomes of the Digital Agriculture Mission in India. How does it aim to transform the agricultural sector?
2. Why is climate adaptation essential for India in the face of climate change? Discuss the challenges in implementing adaptation measures and suggest ways to overcome them.
3. Examine the effectiveness of financial regulatory bodies in India in ensuring financial stability and protecting investor interests. What reforms are necessary to enhance their transparency and accountability?
4. Evaluate the current challenges faced by India's higher education system and suggest measures to enhance its global competitiveness and inclusivity.
5. What is the significance of the United States for India in terms of strategic, economic, and technological cooperation? Analyze the potential areas of growth and challenges in this partnership.
6. Discuss the major causes of air pollution in Delhi and the Gangetic Plain, highlighting the role of stubble burning, vehicular emissions, and industrial pollution.
7. Discuss the role of industrial clusters in India's economic growth. What challenges hinder their development, and what measures can the government take to enhance their productivity, competitiveness, and sustainability?
8. "Despite technological interventions, India's Public Distribution System (PDS) continues to face challenges in ensuring efficiency and addressing nutritional security". Discuss and suggest comprehensive reforms to make it more efficient.
9. Discuss the role of carbon trading as a tool for climate mitigation. Analyse its potential with a focus on impact on developing countries.
10. Analyse the key challenges faced by India's healthcare system and suggest measures to strengthen its effectiveness and accessibility for all sections of society.
11. Assess the strategic, economic, and environmental significance of developing India's maritime infrastructure. How can strengthening this sector contribute to India's self-reliance, trade resilience, and regional security in the Indo-Pacific?
12. Discuss the significance of ethanol blending in India's energy security and environmental goals. What challenges does India face in achieving its ethanol blending targets?
13. Local bodies in India face significant challenges in governance due to the inadequate devolution of the 3Fs (Functions, Finances, and Functionaries). How can the devolution of powers, resources, and personnel be strengthened to improve the functioning of local governance?
14. How can the integration of Digital Public Infrastructure (DPI) and AI through GovAI improve public service delivery in India, and what challenges and opportunities does it present?
15. Evaluate the effectiveness of India's 'Neighbourhood First' policy in fostering regional cooperation and addressing key challenges in the South Asian Region.
16. Despite sustained economic growth, India continues to face challenges in creating quality and inclusive jobs. Analyze the key factors affecting job creation in India and suggest policy measures to address these challenges.
17. Discuss the challenges faced by India's prison system and propose measures for its effective reform.
18. In India, agricultural policy has evolved to meet the changing needs of the rural economy. Evaluate the effectiveness of India's agricultural policies in addressing the concerns of farmers, food security, and sustainability.

Drishti Mains Questions

19. India's G20 presidency in 2023 was a defining moment in showcasing its diplomatic leadership and championing the concerns of the Global South. Discuss.
20. What are the key challenges in India’s technological regulation, and how can global models like the EU’s General Data Protection Regulation influence India’s regulatory framework?
21. Critically analyze the challenges and opportunities in regulating India's urban landscape, with a focus on urban planning, governance, and sustainable development. How can these issues be addressed to promote inclusive and resilient urban growth?
22. Why is investing in the semiconductor sector crucial for India's economic and technological growth? Discuss the challenges involved in building a self-reliant semiconductor ecosystem in India.
23. "India's electoral democracy is vibrant yet faces systemic challenges that require urgent reforms." Discuss in light of recent electoral trends and suggest measures to strengthen the democratic process in India.
24. Despite significant economic progress, poverty continues to persist as a critical challenge in India. Analyze the reasons for its persistence and suggest effective measures to address this issue comprehensively.
25. Discuss the role of sports in driving India’s socio-economic growth. Highlight the initiatives undertaken by the government to promote sports and the challenges that need to be addressed for realizing its full potential.