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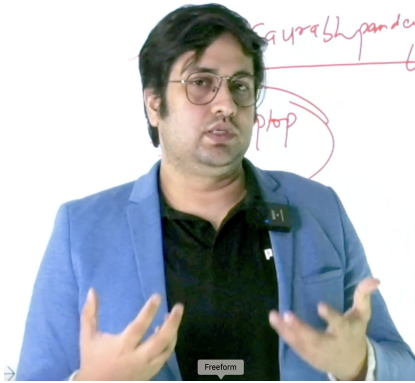

By saurabh Pandey

THE HINDU

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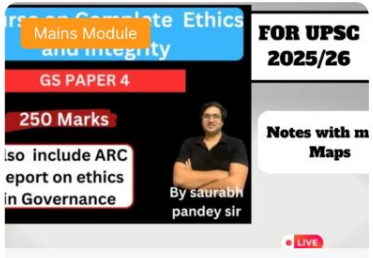

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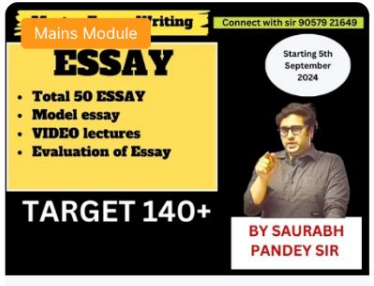

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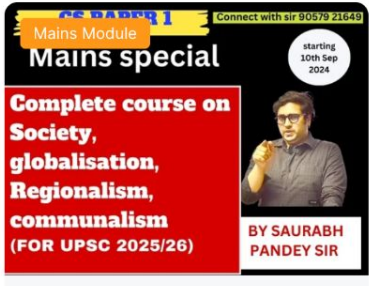

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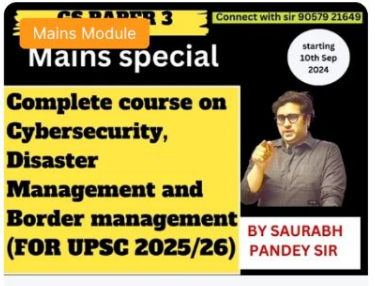

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Dried ashwagandha roots. PIYUSH KOTHARI (CC BY-SA 4.0)

Citrus limon Osbeck, with a blossom visible. ELENA CHOCHKOVA (CC BY-SA 4.0)

Medicinal foods: a category that is missing from the regulator's plate

Researchers have explored turmeric's potential in laboratory tests and clinical trials, with many positive results. What may not be apparent to a layperson, however, is that the dose in which we consume turmeric as a spice is much lower than the dose in which it is used in therapeutic trials

Megha
Bob Allkin
Varun Subramaniyan

Women sifting through fresh turmeric at a market in Erode. GOWRISHANKAR M./THE HINDU

Nature's bounty has provided humans with a wide diversity of plants that we consume daily as food. In some indigenous knowledge systems, such as Ayurveda, the same plants are also recognised as medicines. Throughout the 21st century, researchers discovered novel compounds and drugs from plants used in traditional medicine; today, the world is mining the same plants and knowledge base for wider health benefits.

Sustainable, natural products are increasingly in demand as nutraceuticals: food ingredients with both nutritional and pharmaceutical benefits and which promote wellness. The authors of this article – from the University of Trans-Disciplinary Health Sciences and Technology (TDU), Bengaluru and the 'Plants for Health' team at the Royal Botanic Gardens in the U.K. – recently conducted a study funded by the British High Commission. We found that of the 7,564 medicinal species listed in 11 referenced sources, approximately a quarter (1,788) were documented as food as well as medicine.

Safety of foods as medicine

Although centuries of traditional use provide empirical support for the use of plants for medicinal purposes, many and their derivatives can be found in the market today in new combinations, recipes, and applications that are far removed from their prior classical use. For instance, several herbs are available in the form of pills today, but in antiquity, a physician may have recommended consuming them in the form of a decoction in warm water. While traditional use is generally safe as food, are these new avatars safe as medicines as well? How will plants be identified for potential nutraceutical benefits? And who will regulate the uses of a plant that is a food as well as a medicine?

Consider turmeric, the staple spice of the Indian pantry. There is a rich store of information from traditional sources as to its therapeutic value and culinary use, and a large volume of scientific studies of both the whole rhizome as well as of one of its better-known bioactives, curcumin. From cancer to inflammation, researchers have explored turmeric's potential in laboratory tests and clinical trials, with many positive results. What may not be apparent to a layperson, however, is that the dose in which we consume turmeric as a spice is much lower than the dose in which it is used in therapeutic trials. It is uncommon to find warnings attesting to the fact that high daily doses of turmeric can have toxic effects.

Of the 1,788 Indian food plants identified by this work as being used as both food and medicine, just over 8% (or 139 species) are documented in the 2017 Indian Food Composition Table (IFCT), the official reference for the nutrient value of commonly used food ingredients. The Ayurvedic pharmacopoeia cites herbal substances derived from 334 plants. The overlap of plant species between the IFCT and the Ayurvedic pharmacopoeia is more than 90%, underscoring why consumers believe ayurvedicines can be consumed as food.

Discord and conflict

An analysis of the contents of the 11 published references threw up two other problems with the listing of plants: (i) an extraordinary level of discordance and ambiguity in how scientific names are used to refer to plants, and (ii) the lack of information and conflicting evidence about the plant parts to be used. In total, we found 21,033 different scientific plant names were cited in the 11 reviewed publications. But because of synonymy, these names refer to just 7,564 different plants – an issue that extends to the scientific literature as well. These scientific synonyms add to the complexity for regulators; for consumers when they are trying to find the relevant information; and for researchers when they are comparing their findings related to a plant across different scientific studies.

The scientific name of many life-forms is binomial: the name of the genus and the name of the species in that genus. For example, in *Homo sapiens*, 'Homo' is the genus and 'sapiens' is the species name. For plants, the binomial name also includes the name of the person who first published that Latin name. This name, however, is not fixed.

As researchers collect more DNA and chemical evidence, plant taxonomists are developing better insights into how plants are related to one another and making changes to the taxonomic hierarchy accordingly. In this way, researchers publish more than 10,000 changes to plant scientific names every year. Regulations of the way plants are named also control how their subspecies, varieties, and hybrids are specified in scientific terms.

Thus, what is a 'lemon' to a non-expert person would perhaps fully be described as *Citrus limon* (L.) Osbeck to the botanist. Unfortunately, this precision of labelling and the nuances are rarely captured in food composition tables. For example, the IFCT 2017 catalogues 'lemon' simply as *Citrus limon*, without indicating its hybrid origin or mentioning which variety of the listed species researchers studied. In fact, imprecise or ambiguous plant names were observed to the tune of 100% in IFCT 2017 and 80% in the Ayurvedic pharmacopoeia of India.

Need for standard names

This has serious implications for the regulatory process – not just for human health but also biodiversity conservation. Climate change will likely have an unequal impact on different plant varieties and their nutritional value and bioactivity.

To be able to consistently and reliably regulate plants and their derived products, therefore, we need appropriate use of scientific nomenclature. Since plants show little respect for national boundaries and many of the plants consumed in India may have first taken root in other countries, it is important for regulatory and legal purposes to acknowledge international efforts to standardise plant nomenclature.

Although centuries of traditional use provide empirical support for the use of plants as medicine, many and their derivatives can be found in the market today in new combinations, recipes, and applications that are far removed from their prior classical use

Thanks to COVID-19, many would have heard about giloy or ashwagandha. These names refer to two plants widely used in Ayurveda. Fewer people, however, will be aware that it is the stem of *Tinospora cordifolia* (Willd.) Hook.f. & Thomson that is used in giloy, and the root of *Withania somnifera* (L.) Dunal that is used in ashwagandha – both for medicinal purposes.

In the case of giloy, medicinal uses of the leaves, fruits, and roots are also mentioned in Ayurveda and folk medicine. Such information regarding the relevant parts of each plant is rarely included in the labels of consumer goods, however. Where the scientific name is mentioned, it is often incomplete or misspelt.

Regulation by which regulator?

This is important from a nutritional perspective as well. The leaves of bhringaraj (*Eclipta prostrata* (L.) L) are celebrated in Ayurveda for their ability to promote good hair health and are marketed as such in several products. The same plant is also consumed as a green leafy vegetable in certain parts of India, and yet no nutrient information is found in the IFCT 2017.

Regulators are undoubtedly best placed to address questions regarding the toxicity of plant materials. But then by which regulator: those responsible for a food or those with a responsibility for medicines? Further, do we need separate regulations for plant-based medicinal foods?

This is an important question because in a majority of countries, food and medicine are regulated by separate government agencies, and they don't acknowledge that the same plant can have different uses. In six economies that we examined – Brazil, China, the European Union, India, the U.S., and the U.K. – it was observed that there was a distinct regulator for food and nutrition and another one for drug testing and licensing. There were some exceptions: for example, the Medicines and Healthcare Products Regulatory Agency, the health regulator in the U.K., recognises "border products" that straddle the divide between food and medicines.

In India, however, food is regulated by the Food Safety and Standards Authority of India (FSSAI) and drug licensing by the Central Drugs Standard Control Organisation (CDSCO).

Drug regulators, unsurprisingly, establish far higher requirements for evidence for efficacy and safety than do food regulators. There is no one simple approach to integrating evidence across domains, yet current attempts to share knowledge across regulators are currently also hampered by their use of inconsistent and/or imprecise plant names.

The health and wellness industry is set to grow in the coming years as richer economies age and people's incomes become more able to support investments in natural plant products, which are derived primarily from traditional knowledge. To benefit producers and consumers alike, the use of a standardised, globally accepted, and regularly updated plant nomenclature list is essential.

(Megha is an associate professor of Ayurveda biology and holistic nutrition and Varun Subramaniyan is a scientist of traditional knowledge, data science, and informatics – both at The University of Trans-Disciplinary Health Sciences and Technology, Bengaluru. megha@tdu.edu.in, varunpbi@tdu.edu.in. Bob Allkin is programme manager in the Department of Digital Revolution at the Royal Botanical Gardens, Kew. b.allkin@kew.org)

Topic→ Diversity and Challenges in Plant-Based Nutraceuticals

🌱 Diversity of Plants

Humans consume a wide variety of plants as food.
Many plants are recognized as medicines in Indigenous knowledge systems like Ayurveda.

💊 Nutraceutical Demand

Growing demand for sustainable, natural products.
Products serve as nutraceuticals, offering both nutritional and pharmaceutical benefits.

📊 Medicinal and Food Overlap

A study identified 1,788 species of plants documented as both food and medicine.
Out of 7,564 medicinal species reviewed.

⚖️ Safety Concerns

Traditional uses of plants are generally safe.
New formulations and dosages may pose safety risks.
Highlights the need for regulation.

🔍 Scientific Naming Issues

Significant discordance in scientific names for plants.
Over 21,000 names refer to just 7,564 plants.
Complicates research and regulation.

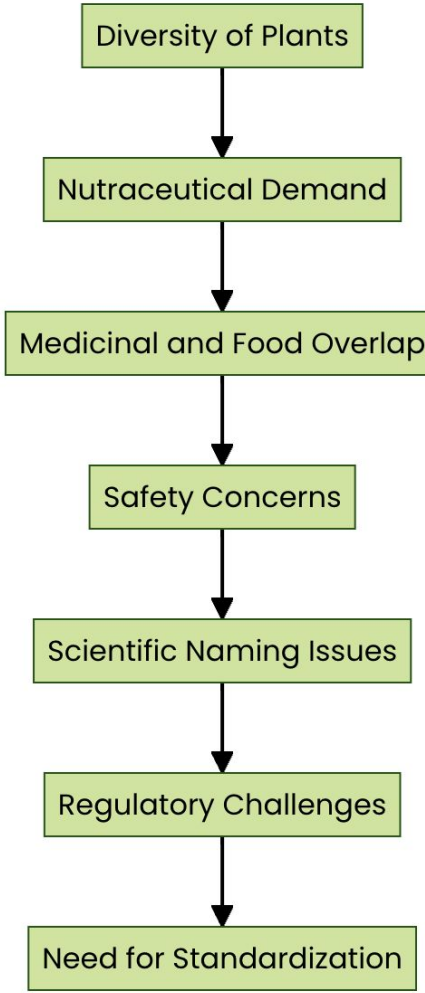
- 🌍 **Regulatory Challenges**

  Different countries have separate regulators for food and medicine.
  Complicates regulation of plants serving dual purposes.

📉 **Need for Standardization**

Pressing need for standardized scientific nomenclature.
Regulatory frameworks for plant-based products to ensure safety and efficacy.

Summary: The intersection of food and medicine in plants presents both opportunities and challenges, necessitating better regulation and standardization to ensure safety and efficacy.


Diversity of Plants
Nutraceutical Demand
Medicinal and Food Overlap
Safety Concerns
Scientific Naming Issues
Regulatory Challenges
Need for Standardization

Solar, a game changer in women's empowerment

Nikhil Kumar

a climate communications professional

Karan Mangotra

leads partnership at International Solar Alliance

Until Charles Fritts installed the first rooftop photovoltaic solar array using 1%-efficient selenium cells on a roof in New York City in 1884, the sun was a humble driving force behind photosynthesis, evaporation, and countless natural processes. Today, apart from being the major factor in the climate patterns that sustains life on earth, it is also a transformative, democratising force in electricity generation. Distinct from traditional sources such as coal, oil, gas, nuclear, and hydropower, which require extensive infrastructure and intermediary transmission lines, solar energy can now be harnessed directly at its point of use – in homes. It is now a home product.

The impact of decentralisation

Decentralisation of power generation has significant implications for both environmental sustainability and societal structures. The ability to generate energy close to where it is consumed unlocks a cascade of benefits beyond mere convenience. Socially, economically, and developmentally, solar places power – literally and figuratively – into the hands of individuals and communities, breaking down barriers that have long excluded them from the energy economy. This shift empowers people, particularly women, making them direct participants in the economy and catalysts for change.

Women often bear the brunt of poor energy access, impacting their health, safety, and economic potential. Solar addresses this. In Gujarat's Little Rann of Kutch, women salt farmers have transitioned from expensive diesel to solar pumps, boosting their income by 94% and reducing CO_2 emissions by up to 1,15,000 metric tons annually. Initiatives such as the Barefoot College (India), the Grameen Shakti (Bangladesh), and Solar Sister (Africa) empower women to become solar engineers, benefiting millions and improving community health and safety. For example, We Care Solar's suitcases reduced perinatal deaths by 72% in Uganda's health centres.

Solar, especially through localised solutions, is advancing women's financial inclusion and enabling income generation directed towards education, health care, and other essential activities. By integrating women across the value chain – from end-users to entrepreneurs – solar is driving societal progress and elevating the status of women. In fact, solar employs more women than any other energy sector. In 2022, the solar photovoltaic industry alone provided jobs to around 4.9 million people, with women accounting for 40% of the workforce. With India's ambitious renewable targets, the sector is expected to create three million new jobs by 2030, offering significant opportunities for women if the current trends hold. No other energy project comes close to this potential.

For solar energy to truly empower communities, policy must be equitable, positioning women not just as beneficiaries but also as change agents

Clean and scalable but there are challenges

Solar also uplifts marginalised communities. Unlike coal, which has impoverished resource-rich regions, solar offers a sustainable path forward. India's coal mining districts exemplify the 'resource curse', where local communities suffer from poor health, education, and living conditions, with over 50% in poverty.

Distributed solar systems link energy production with community well-being, driving climate resilience. Off-grid projects provide clean energy to areas without traditional electricity, supporting economic development in rural regions. Rooftop installations and mini-grids offer scalable, eco-friendly solutions, creating local jobs without the environmental impact of large-scale projects.

Effective community engagement is crucial for the success of these projects. For instance, in India, formalised community institutions such as self-help groups, farmer-producer organisations, and panchayati raj institutions are integral to village infrastructure planning. Where formal structures are absent, rural energy committees can oversee mini-grid operations, encompassing everything from planning and installation to tariff determination and maintenance, which ensure that energy access is thorough and benefits the entire community.

As solar technology progresses, three challenges persist: geographical imbalance, with most investments concentrated in developed nations leaving developing countries, particularly Africa, lagging; sectoral imbalance is evident as large-scale solar farms receive the majority of funding while smaller, crucial applications such as solar pumps and cold storages are overlooked; manufacturing concentration in just two countries disrupts supply chains and inflates prices, a problem set to intensify with rising global demand. The challenge at the home level will be to ensure easy availability and affordability of solar. This will require robust government and market support.

The second is to focus on the life cycle of solar technologies, with an emphasis on recycling and circularity to manage waste. Establishing clear guidelines for processing solar photovoltaic materials is vital, ensuring that they contribute to sustainability rather than exacerbate waste issues. A robust framework should mandate producer responsibility and involve government and end-of-life management collaboration, fostering efficient recycling and encouraging recyclability. Additionally, exploring mobile recycling plants and implementing stringent waste management processes are crucial for enhancing the environmental and economic health of the solar sector.

Policies and gender

A just energy transition is more than a shift from fossil fuels to renewables. It is about ensuring that all communities, especially those historically sidelined, benefit from the change. For solar energy to truly empower communities, it must be inclusive and equitable, positioning women not just as beneficiaries but also as pivotal change agents. This necessitates a re-evaluation of energy policies through a gender lens.

Current national-level electricity access policies often lack this perspective, limiting their effectiveness in combating inequality. It is crucial for electrification initiatives to integrate with sectors such as agriculture, forestry, and rural development to form a holistic approach to energy access. This integration helps to dismantle the systemic barriers that disproportionately affect women, fostering a more inclusive energy economy. With this, we can ensure that solar supports environmental sustainability, drives socio-economic development, and becomes a true catalyst for a liveable planet.

Topic→Solar Energy: A Catalyst for Change

Key Highlights

☀️ Historical Milestone: In 1884, Charles Fritts installed the first rooftop photovoltaic solar array in New York City, marking the dawn of solar energy utilization.

🌍 Decentralization Benefits: Solar energy facilitates localized power generation, reducing dependency on traditional energy sources and infrastructure.

👩‍🌾 Empowerment of Women: Solar initiatives empower women, especially in regions with limited energy access, boosting their economic potential and participation in the energy economy.

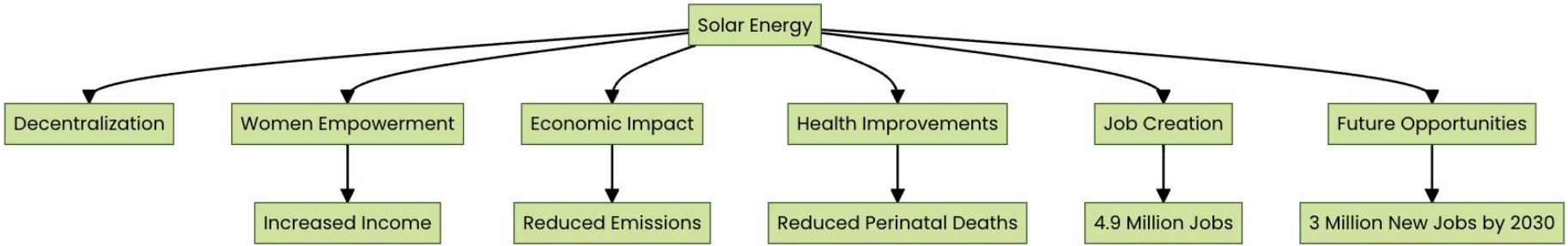
📈 Economic Impact: In Gujarat, women salt farmers using solar pumps increased their income by 94% and reduced CO_2 emissions by 115,000 metric tons annually.

🏥 Health Improvements: Solar solutions, like We Care Solar's suitcases, have significantly reduced perinatal deaths in Uganda's health centers by 72%.

👩‍🔧 Job Creation: The solar photovoltaic industry employed approximately 4.9 million people in 2022, with women comprising 40% of the workforce.

🌱 Future Opportunities: India's renewable energy targets could create three million new jobs in the solar sector by 2030, offering substantial opportunities for women.

Impact of Solar Energy:



🌞 Solar Energy Benefits

Empowerment: Solar energy provides a sustainable alternative to coal, uplifting marginalized communities.
Impact: It addresses impoverished conditions in resource-rich areas.

🌍 Community Engagement

Importance: Effective engagement is crucial for solar project success.
Role of Institutions: Local institutions are key in planning and operation.

⚡ Off-Grid Solutions

Clean Energy Access: Off-grid projects bring electricity to rural areas.
Economic Growth: They foster development and job creation.

🌱 Challenges in Solar Adoption

Investment Imbalances: Geographical and sectoral disparities exist.
Overlooked Areas: Developing countries and smaller applications need attention.

♻️ Sustainability Focus

Life Cycle Emphasis: Recycling guidelines and waste management are needed.
Enhancement: These practices enhance sustainability.

👩‍🌾 Gender Inclusivity

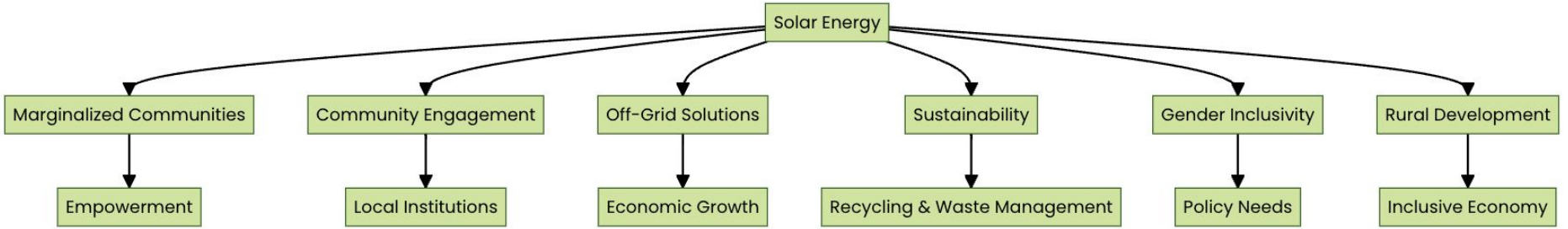
Energy Transition: Women must be included as change agents.
Policy Needs: A gender lens is necessary to combat inequality.

🌾 Holistic Integration

Electrification and Agriculture: Integration is vital for removing barriers.
Inclusive Economy: Promotes an inclusive energy economy benefiting women.

Summary: Solar energy offers a sustainable solution for marginalized communities. Addressing challenges like investment imbalances and gender inclusivity is essential for effective implementation.

Conceptual Overview:



The burgeoning expenditure of elections

What is the difference between the election expenditure limits for candidates and political parties in India? How does the U.S. handle election financing, and what role do Super PACs play? Why is curbing the illegal distribution of cash to voters crucial?

EXPLAINER

Rangarajan R.

The story so far:

The total expenditure for U.S. presidential and Congressional elections in November 2024 is estimated at around U.S. $16 billion (equivalent to ₹1,36,000 crores). According to the Centre for Media Studies (CMS), the total expenditure by various political parties for the general election to Lok Sabha this year was around ₹1,00,000 crores.

What are the limits in India?

The election expenditure limit for candidates is ₹95 lakh per Lok Sabha constituency in larger States and ₹75 lakh in smaller States. With respect to Legislative Assemblies, they are ₹40 lakh and ₹28 lakh for larger and smaller States respectively. These limits are set, from time to time, by the Election Commission (EC). There are no limits on the expenditure of political parties during elections.

What are international standards?

In the U.S., the financing for elections happens primarily by contributions from individuals, corporations, and political action committees (PAC). While there are limits on individual and PAC contributions to candidates, various judgments of the U.S. Supreme Court have resulted in the creation of Super PACs on which there are no limits for spending. Out of the estimated expenditure in the November 2024 election cycle, around $5.5 billion is estimated to be spent on the presidential election. The balance is around $10.5 billion on elections to the House of Representatives and Senate of the U.S. Congress. This humungous raise is due to large donations by organisational donors and Super PACs.

Behind the curtains: In India, candidates from all major parties breach the election expenditure limits by a wide margin. FILE PHOTO

In the U.K., a political party is allowed to spend £54,010 for each constituency they contest. This translates to a limit of £35 million for parties contesting all constituencies. There are also limits placed on candidates' spending during the campaign period. It translates, per constituency, to an average of £46-49,000 during the long campaign period (beginning five months before the full term of the House of Commons ends) and £17-20,000 during the short campaign period after elections are announced.

What are the challenges?

Elections across the world democracies have become very expensive. Such increased expenditure that is met primarily through large donations creates an unholy nexus between the elected representatives and donors who seek favours. This acts as an entry barrier into electoral politics for many well-meaning citizens.

In India, candidates from all major political parties breach the election expenditure limits by a wide margin. Further, there are no limits on political party spending during elections. The official expenditures declared by the BJP and Congress for the 2019 election were ₹1,264 crores and ₹820 crores, respectively. However, according to a report by the CMS, ₹50,000 crore was spent by various parties during the 2019 election.

The report suggests that 35% of this money was spent on campaigns and publicity, while 25% was illegally distributed among voters. The CMS has estimated that spending during the 2024 election by various political parties was close to ₹1,00,000 crores. Such inflated election expenditure fuels corruption, resulting in a vicious cycle.

What can be possible reforms?

The Indrajit Gupta Committee (1998) and the Law Commission report (1999) have advocated for State funding of elections. This would mean the government partially bears the election expenditures of candidates nominated by recognised political parties. However, the feasibility and mechanism for implementing this measure are doubtful in the present context.

Simultaneous elections are touted as a panacea for addressing the issue of rising election expenditures. There are challenges on account of principles of federalism and constitutional amendments to this idea that need to be debated. It must also be noted that this mechanism may rein in campaign and publicity expenditure to some extent. However, without curbing the illegal distribution of cash to voters, any form of simultaneous election will not have a significant impact on election expenditure.

In this regard, certain practical steps to create a level playing field regarding election expenditure can be implemented if there is political will. These are based on the EC's 2016 report on 'Proposed Electoral Reforms.'. Firstly, the law must be amended to explicitly provide that 'financial assistance' by a political party to its candidate should also be within the candidate's prescribed election expenditure limits. Secondly, there should be a ceiling on political party expenditures. This may be kept at not more than the expenditure ceiling limit provided for a candidate multiplied by the number of candidates of the party contesting the election. Finally, additional judges may be appointed in High Courts for the speedy disposal of election-related cases, which would act as a deterrent against violating these norms. These reforms would require bipartisan political support and need to be expeditiously implemented.

Rangarajan R. is a former IAS officer and author of 'Polity Simplified'. Views expressed are personal.

THE GIST

- In India, candidates from major political parties frequently exceed the election expenditure limits set by the Election Commission. These limits are meant to regulate spending and prevent undue influence, but they are often disregarded.
- In the U.S., spending is largely driven by Super PACs with no spending limits. The U.K. has strict caps on both party and candidate expenditures.
- Rising election costs in India, as well as globally, create significant challenges. In India, inflated election expenditures foster a deep-rooted nexus between politicians and donors, creating entry barriers for genuine candidates without deep financial backing.

Topic-- > Global Election Expenditure Overview

💰 Estimated U.S. Election Expenditure

Total Expenditure: Estimated at around $16 billion (₹1,36,000 crores) for the U.S. presidential and Congressional elections in November 2024.

🇮🇳 India's Election Spending

Lok Sabha Elections: Political parties spent approximately ₹1,00,000 crores.

📊 Expenditure Limits in India

Candidate Spending Limits: ₹95 lakh in larger States and ₹75 lakh in smaller States for Lok Sabha elections.
Political Party Spending: No limits imposed.

With respect to Legislative Assemblies, they are ₹40 lakh and ₹28 lakh for larger and smaller States respectively. These limits are set, from time to time, by the Election Commission (EC).

🇺🇸 U.S. Election Financing

Sources: Individuals, corporations, and PACs.
Super PACs: No spending limits.
Presidential Election: Expected expenditure of approximately $5.5 billion.

🇬🇧 U.K. Spending Limits

Per Constituency: £54,010.
Total Limit: £35 million for all constituencies.
Candidate Limits: Specific limits during campaign periods.

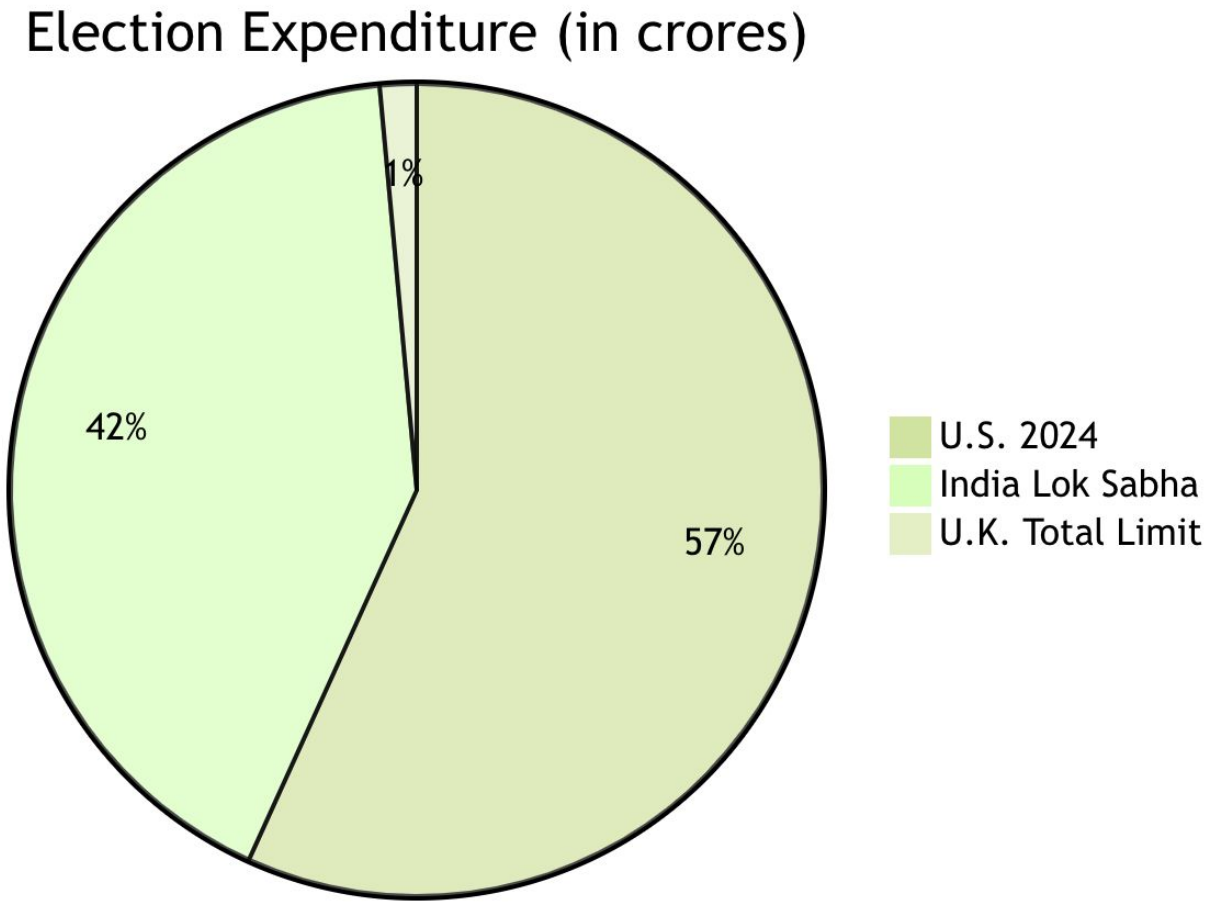
⚖️ Challenges of High Expenditure

Nexus with Donors: High costs create connections between officials and large donors.
Barrier to Entry: Difficult for well-meaning citizens to enter politics.

📉 Corruption and Election Spending

India's 2019 Elections: Major parties reportedly spent ₹50,000 crore, exceeding limits and fostering corruption.

Election Expenditure Comparison:



Electoral Reforms Overview

Key Aspects of Electoral Reforms

🗳️ State Funding of Elections: Recommendations from the Indrajit Gupta Committee (1998) and the Law Commission report (1999) suggest state funding to partially cover election expenses for candidates from recognized political parties.

⚖️ Feasibility Concerns: There are significant doubts about the feasibility and implementation mechanisms of state funding in the current context.

🔄 Simultaneous Elections: Proposed as a solution to rising election expenditures, simultaneous elections face challenges related to federalism and constitutional amendments.

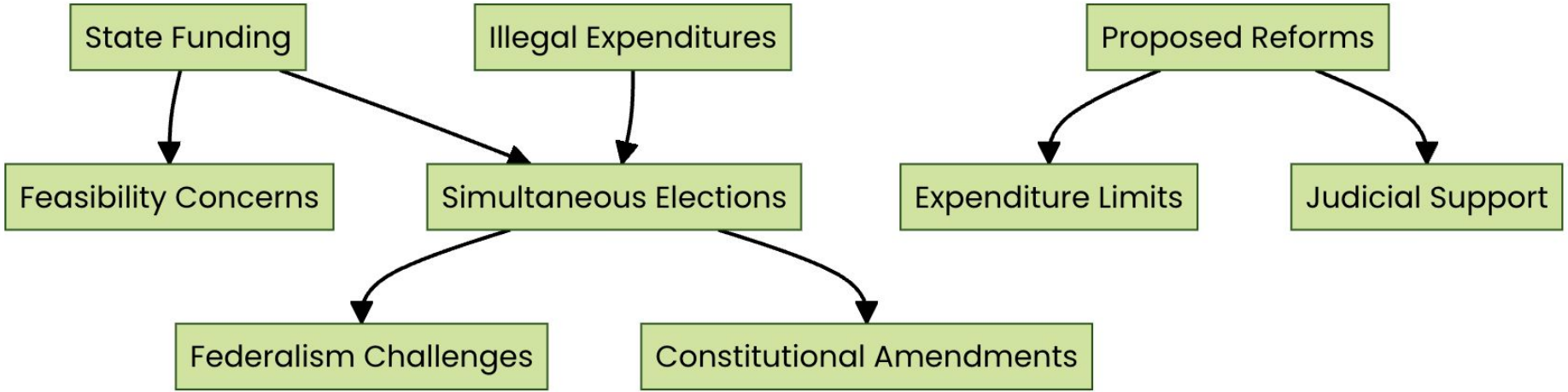
💰 Curbing Illegal Expenditures: Without addressing illegal cash distribution to voters, simultaneous elections may not significantly reduce overall election spending.

📜 Proposed Electoral Reforms: Based on the Election Commission's 2016 report, reforms include amending laws to limit financial assistance from parties to candidates within prescribed expenditure limits.

📊 Ceiling on Party Expenditures: A proposed ceiling on political party expenditures should be based on the number of candidates multiplied by the individual candidate's expenditure limit.

⚖️ Judicial Support: The appointment of additional judges in High Courts is suggested to expedite the resolution of election-related cases, acting as a deterrent against violations.

Conceptual Overview:



Summary: The text discusses proposed electoral reforms aimed at reducing election expenditures, including state funding, simultaneous elections, and stricter regulations on party and candidate spending.

What challenges does India face in fertilizer imports?

What impact has the conflict in Ukraine had on the global fertilizer market and its effects on India?

A. M. Jigeesh

The story so far:

With the crisis continuing in Ukraine and Gaza, experts and policymakers are concerned about further increases in the prices of the components used for making petroleum-based chemical fertilizers. Recently, Senior Economist of the Food and Agriculture Organization Nicholas Sitko told *The Hindu* that India has to increase its own fertilizer production capacity. The Agriculture Minister of the country's largest foodgrains producing Uttar Pradesh recently complained that the State has the stock of fertilizers for only 10 more days. The sowing of winter rabi crops has started in almost all the wheat-growing States and fertilizers such as Diammonium phosphate (DAP) and NPK [Nitrogen, Phosphorus, and Potassium] are essential for its growth.

What is the current import fertilizer import scenario?

Though the latest data on import is yet to be made available by the Ministry, the Standing Committee of Parliament on Chemicals and Fertilizers, in August 2023, tabled a report on 'Planning for Fertilizers Production and Import Policy on Fertilizers Including GST and Import Duty Thereon' in both the Houses. It expressed concern that the "production capacity of fertilizers does not commensurate with its demand/requirement and, therefore, the gap between demand and supply is met through imports." According to the report, about 20% of the domestic requirement of urea, 50-60% of the domestic requirement of DAP, and 100% of the domestic requirement of Muriate of Potassium (MOP, or Potash) is met through imports.

How has India's fertilizer production changed?

In 2021-22, India's yearly consumption of all major chemical fertilizers was approximately 579.67 lakh metric tonnes (LMT), comprising 341.73 LMT of urea, 92.64 LMT of DAP, 23.93 LMT of MOP, and 121.37 LMT of NPK. In 2020-21, the total consumption of fertilizers was about 629.83 LMT. The country produced 435.95 LMT of chemical fertilizers in 2021-22, resulting in a shortfall of 143.72 LMT relative to demand. While MOP is not produced here, in 2021-22, India produced 250.72 LMT of urea, 42.22 LMT of DAP, 89.67 LMT of NPK, and 53.34 LMT of Single Super Phosphate (SSP). Total production in 2014-15 was 385.39 LMT, indicating an increase of only about 50 LMT over seven years.

In the case of Urea, the most consumed fertilizer, in 2019-20, the production was 244.58 LMT and the use was 336.96 LMT. In 2020-21, the country produced 246.05 LMT of urea and consumed 350.51 LMT. In 2021-22, the figure was 250.72 LMT and 341.72 LMT, respectively.

The Centre allocated ₹ 1.79 lakh crore as fertilizer subsidy under the Budget estimates for 2023-24. Out of this, for indigenous P&K Fertilizers, the subsidy amount was ₹25,500 crore and ₹18,500 crore for imported P&K Fertilizers. For indigenous Urea, the subsidy was ₹1,04,063.20 crore while the subsidy for imported urea was ₹ 31,000 crore.

What is the situation in Ukraine and Gaza?

Dr. Sitko said that he does not see any stability in fertilizer markets now due to the situations in Ukraine and Gaza. He is primarily bothered about the impact of the crisis on the oil prices, which will spill over to the by-products such as fertilizers. According to an answer provided in Lok Sabha, in 2018-19, 2019-20, and 2020-21, India's fertilizer imports were mostly from countries such as China, Russia, Saudi Arabia, UAE, Oman, Iran and Egypt. The worsening situation in West Asia and the ongoing conflict in Russia and Ukraine could impact imports from these regions.

What can India do?

Experts like Dr. Sitko have been asking India to enhance its fertilizer production capacity and to shift its farming systems to reduce dependence on imported fertilizers while making better use of the existing fertilizers. Suggestions such as using nano urea, shifting to natural farming, and enhancing the capacity of fertilizer factories have also been made to the government.

The Standing Committee of Parliament also pointed out the need for policy initiatives aimed at creating an environment that would facilitate investments in the public, co-operatives, and private sectors engaged in the manufacturing and marketing of fertilizers.

Commenting on the new investment policy, implemented in 2012, to streamline fertilizer production, the committee said it is satisfying to note that six new Urea plants have since been set up each having an annual production capacity of 12.7 LMT thereby adding Urea production capacity of 76.2 LMT per annum. "Now, 36 Urea manufacturing units are functioning, out of which, four new Urea Units viz Ramgundam, Gorakhpur, Sindri Unit of Fertilizers Corporation of India Limited and Barauni unit of Hindustan Fertiliser Corporation Limited, have been revived by setting up of new gas-based Greenfield units," the panel had noted.

THE GIST

- The conflict in Ukraine has led to rising prices of raw materials used in fertilizer production, affecting global fertilizer costs and subsequently increasing prices in India.
- The instability in fertilizer markets is likely to impact agricultural production in India, posing risks to food security and increasing dependence on government subsidies.

Topic → Fertilizer Crisis in India: Challenges and Solutions

🌍 Global Crisis Impact

Ongoing crises in Ukraine and Gaza are raising concerns about rising prices of petroleum-based chemical fertilizers.

📉 Fertilizer Shortage

Uttar Pradesh's Agriculture Minister reported only 10 days' worth of fertilizer stock available for winter rabi crop sowing.

📊 Import Dependency

India relies heavily on imports for fertilizers:

- 20% of urea
- 50-60% of DAP
- 100% of MOP

📈 Production vs. Consumption

In 2021-22, India produced 435.95 LMT of fertilizers.
Faced a shortfall of 143.72 LMT against a consumption of 579.67 LMT.

💰 Subsidy Allocation

The Indian government allocated ₹1.79 lakh crore for fertilizer subsidies in the 2023-24 budget.
Significant amounts for both indigenous and imported fertilizers.

🔄 Need for Policy Changes

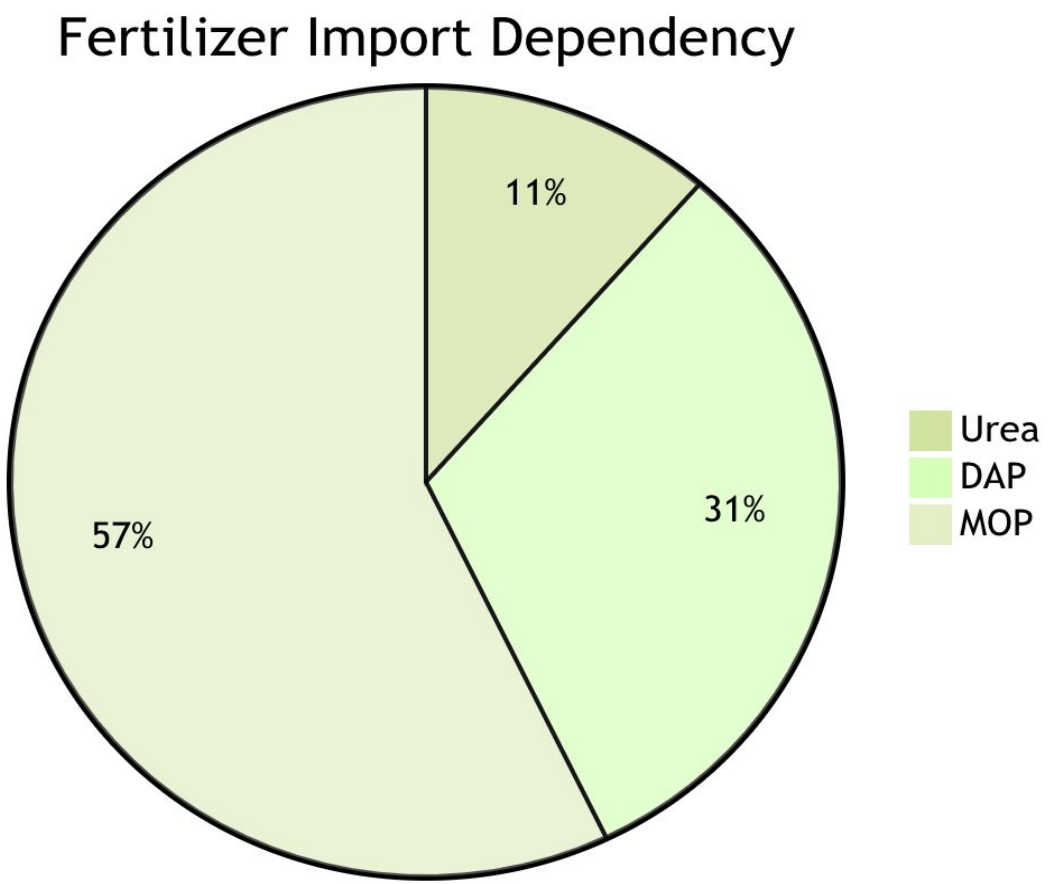
Experts advocate for enhancing fertilizer production capacity.
Shifting farming practices to reduce reliance on imports.

🏭 New Urea Plants

Six new Urea plants have been established since 2012.
Increased production capacity by 76.2 LMT annually.

Summary: India's fertilizer production is insufficient to meet demand, heavily relying on imports amid global crises, prompting calls for increased domestic production and policy reforms.

Fertilizer Import Dependency:



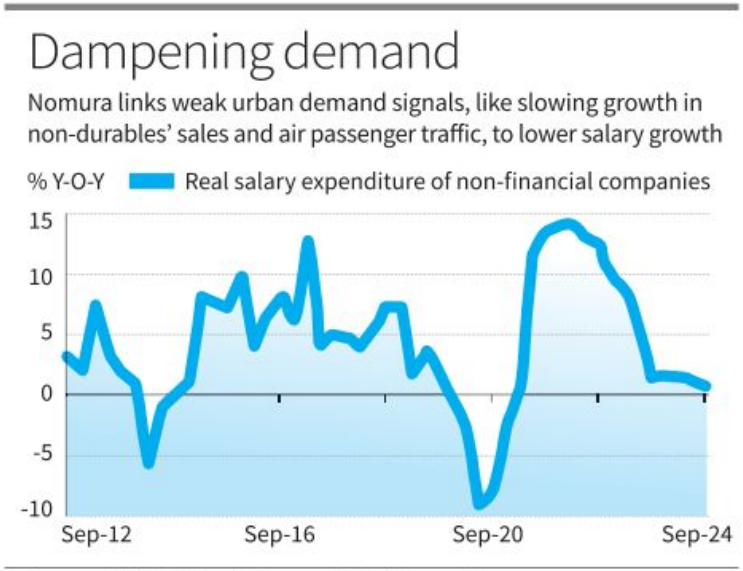
Cyclical slowdown? Nomura thinks so

Days after its research report stating 'the growth glass looks half empty' for India, Nomura economists signal weak urban demand is unlikely to rebound soon and GDP growth may even slip under 6.7% this year

Vikas Dhoot
NEW DELHI

India's economy has likely entered a cyclical growth slowdown and growth may slip below 6.7% in the face of emerging risks, Nomura economists reckoned, noting that weak urban demand is likely to stay insipid amid high interest rates and moderating wage growth.

"Urban consumption indicators have been softening lately... We believe this weakness in urban demand is likely to continue," Nomura's economists Sonal Varma and Aurodeep Nandi said in a note on Monday. They linked this to lower real salary hikes, fading pent-up demand and tight credit conditions.



Source: CMIE, CEIC and Nomura Global Economics

***Note:** Sep-24 reading is provisional. Nominal readings deflated by CPI-Urban for conversion to real data.*

"We believe India's economy has entered a cyclical growth slowdown. Coincident and leading growth indicators point to a further moderation in GDP growth and the RBI's forecast of 7.2% for 2024-25 is overly optimistic, in our view," they said. Nomura has projected GDP growth of 6.7% this year and 6.8% in 2025-26, but the note said downside risks to this forecast are rising.

Companies are scaling down their salary outlays, the research note pointed out. "When deflated by the urban inflation, real salary and wage expenditure growth of listed non-financial corporates - a proxy for real urban wages - has moderated to 0.8% year-on-year in Q2 FY25 from 1.2% in Q1 FY25, and is down from 2.5% in FY24 and 10.8% in FY23. This likely reflects a mix of weaker nominal salary growth and a leaner workforce," they concluded.

"Additionally, the post-pandemic surge in pent-up demand has faded, monetary policy is tight and the RBI's macroprudential crackdown on unsecured, frothy credit is being reflected in the slowdown in personal loans and lending growth by non-banking finance companies," the economists averred, following up on an October 17 report which said 'the growth glass looks half empty' for India.

Topic-- > India's Economic Outlook

Key Economic Indicators

📉 Cyclical Growth Slowdown: India's economy is likely experiencing a cyclical growth slowdown, with growth projected to slip below 6.7%.

🏙️ Weak Urban Demand: Urban consumption indicators are softening due to high interest rates and moderating wage growth, leading to continued weakness in urban demand.

💼 Salary Outlays Reduced: Companies are scaling down salary expenditures, with real salary growth for non-financial corporates dropping significantly.

📊 GDP Growth Projections: Nomura projects GDP growth of 6.7% for the current year and 6.8% for 2025-26, but notes rising downside risks to these forecasts.

🚗 Transport Contribution

On October 25, stubble burning accounted for 15% of Delhi's air pollution.
Transport contributed about 18% of PM 2.5 levels.

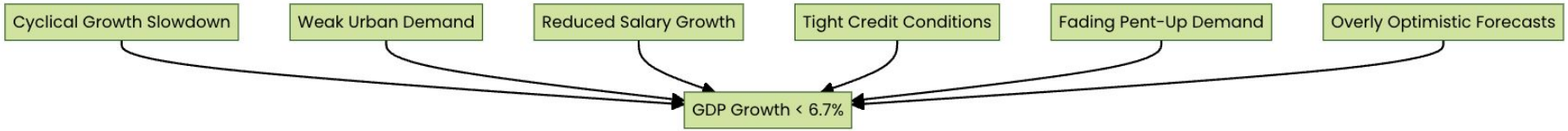
📉 Fading Pent-Up Demand: The post-pandemic surge in pent-up demand has diminished, contributing to the economic slowdown.

💳 Tight Credit Conditions: The Reserve Bank of India's (RBI) strict monetary policy and crackdown on unsecured credit are reflected in the slowdown of personal loans and lending growth.

🔍 Overly Optimistic Forecasts: Nomura believes the RBI's forecast of 7.2% GDP growth for 2024-25 is overly optimistic given the current economic indicators.

Summary: India's economy is facing a cyclical growth slowdown, with weak urban demand, reduced salary growth, and tight credit conditions contributing to a projected GDP growth below 6.7%

Economic Factors Impacting Growth:



Why is Delhi's air quality deteriorating?

What factors contribute to the deterioration of air quality in Delhi during the winter months? How does stubble burning affect PM 2.5 levels? What role do urban emissions from vehicles play in determining air quality? Why is a coordinated approach necessary to tackle the air pollution crisis?

EXPLAINER

Jacob Koshy

The story so far:

With the withdrawal of the southwest monsoon and the onset of winter, the air quality in Delhi has started to nose-dive. This week, the city and its adjoining territories have consistently recorded particulate matter (PM 2.5) levels exceeding 300, or 'very poor' air quality, and forecasts suggest that this could worsen in the coming days. As is now an established pattern, the decline in air quality coincides with the burning of farm stubble, primarily from Punjab.

What is the contribution of stubble burning to air pollution?

Stubble burning refers to a traditional practice of farmers burning the remnants of paddy stalks after harvesting. This method is often the quickest way, as farmers in Punjab and Haryana have a narrow window of October and November to clear their fields and sow wheat for the winter. The environmental impact of stubble burning has been known since the 1990s. Agricultural researchers, while analysing the economics of rice-wheat cropping pointed out that rising labour costs made it expensive for farmers to collect rice stalks strewn across the field that resulted from the use of mechanical devices such as rice shredders and combine harvesters. Though the burning of rice stalk was initially condemned as a waste of valuable manure, concerns were also raised about its harm to farmers' health. However, its link to worsening air quality in Delhi was quantified only over the last decade and a half. Today, the use of sophisticated instruments, modelling studies, and computational methods have enabled the estimation, almost daily, of stubble burning's contribution to air quality in Delhi.

A study by the research and advocacy group Climate Trends of winter pollution trends in 2023 found a "strong correlation" between wind direction originating from Punjab and Haryana and the resulting pollution levels in Delhi. In the case of Punjab, during winter, 54% of the time the wind from the State blew towards Delhi, it led to a spike in air pollution; when the wind originated from Haryana, the figure stood at 27%. Every additional fire incident was correlated with an increase in PM2.5 levels of 12.44 units. Studies over the years, most recently in 2023 by a consortium of IIT Kanpur, IIT Delhi, TERI, and Airshed, Kanpur, found that from mid-October to the end of November 2022, the role of stubble burning to air quality was on average 22% and peaked to as much as 35%. This is fairly consistent with previous studies that have estimated the contribution of stubble burning to range from 20%- 40%. Based on these measurements, the Indian Institute of Tropical Meteorology-Pune (IITM-Pune) maintains an air quality forecast system that models the flow of airborne pollutants through cities. It shows the dynamic nature of stubble burning's impact on Delhi's pollution. For instance, from October 8 to 19 this year, farm fires accounted for less than 1.2% of the PM 2.5 load in Delhi. During this period, the average AQI stayed from 130 -198 (or the "moderate" pollution category). However, on October 21, when stubble burning's relative contribution rose to 3.2%, Delhi's AQI immediately plummeted to 'very poor' (310). On October 23, when the relative contribution of burning reached the seasonal high of 16%, the index deteriorated to 364, still in the 'very poor' region. On October 26, the stubble burning contribution slightly dipped to 14.5%, and the AQI improved to 270 or 'poor' quality.

Stagnant winds: A farmer burns stubble to remove paddy crop residues from a field on the outskirts of Chandigarh. FILE PHOTO

What is the inference from these observations?

The transitioning period from the withdrawal of the monsoon to the onset of winter causes a sharp drop in windspeed, and cause air pollutants to hover closer to the ground rather than being flushed away to the higher realms of the atmosphere. In this situation, any additional source of pollutants -- such as from stubble burning -- can dramatically spike the pollutant load in Delhi. Also, nearly 55% of the pollution in Delhi originates outside its territorial borders, as studies have shown. Thus, relatively small spikes can push the index as much as 100 points and change categories anywhere from 'poor' to 'very poor.'

So is stubble burning the sole villain in Delhi's pollution?

Urban Emissions, a research outfit that tracks air pollution trends nationally, reports that from 2016-23, the improving air quality reflected in the index going from a high of 285 in 2017 to a low of 173 in 2021. However, in six of these seven years, the index stayed above 216 and therefore within the AQI categorisation of 'poor' air quality. However, in Punjab, the farm fires reduced by over an order of magnitude from 17,467 in 2018 (as of October 25, that year) to 1,749 (October 25) this year. Fire incidents in Haryana too have halved since 2020. The paddy harvested in Punjab is more than twice that in Haryana and yet, this has only improved the index by 65 points at the most. Significantly, December, January, and February are officially considered the winter months by the India Meteorological Department and by this time, the atmospheric conditions that create a trap for pollutants and prevent them from being flushed out, grow stronger. However, stubble burning almost entirely ceases. Despite that, data compiled by Urban Emissions says, the air quality index has consistently remained in the 'very poor' and 'severe' (400+) category from 2016-23. This suggests that sources other than stubble burning contribute significantly to air pollution.

Which are these factors?

On October 25 this year, stubble burning was responsible for nearly 15% of Delhi's air pollution. On the same day, 'Delhi transport' which includes particulate matter from vehicles and vehicles crossing into Delhi was responsible for about 18% of the PM 2.5 load, according to the IITM's air quality forecast system. The IIT Kanpur, IIT Delhi, and Teri consortia analysis of the sources of pollution in Delhi found that the real-time source apportionment of PM 2.5 results show secondary inorganic aerosols (SIA), which travel from beyond Delhi, contribute the highest to Delhi's pollution load. The average of winter pollution source apportionment shows SIA (32%) and biomass burning within and outside Delhi (24%) contribute the most followed by vehicles at 17%. The SIAs form when gaseous precursors like sulfur dioxide (SO_2), nitrogen oxides (NO_x), and ammonia (NH_3) react to form ammonium sulfate or ammonium nitrate. In winter, the mean contribution of SIA from the sources within Delhi is 16% and the rest 84% from outside Delhi. In the last few years, policymakers have realised that the sources of air pollution can be tackled only via an airshed approach that requires coordinated action by multiple States including those beyond Delhi to evolve a joint response to the pollution crisis.

THE GIST

- With the withdrawal of the southwest monsoon and the onset of winter, Delhi's air quality has worsened, recording PM 2.5 levels exceeding 300 (classified as 'very poor').
- Farmers in Punjab and Haryana burn stubble after harvesting to quickly clear fields for winter wheat sowing, a practice linked to air quality issues since the 1990s.
- Other sources of pollution, such as secondary inorganic aerosols and urban emissions from vehicles, also significantly impact Delhi's air quality.
- Addressing air pollution in Delhi requires coordinated action among multiple States, as pollution sources often originate beyond the city's borders.

Topic → Delhi's Air Quality and Pollution Sources

📉 Air Quality Improvement

Delhi's air quality index improved from 285 in 2017 to 173 in 2021.
Despite improvements, the index remained above 216 (poor) for six out of seven years.

🔥 Stubble Burning Decline

Punjab saw a significant drop in stubble burning incidents from 17,467 in 2018 to 1,749 in 2023.
Haryana also experienced a reduction in incidents since 2020.

🌬️ Winter Pollution Trends

Stubble burning ceases during winter months (December to February).
Despite this, Delhi's air quality remained in the 'very poor' and 'severe' categories from 2016-2023.

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🌍 Secondary Inorganic Aerosols (SIA)

SIA, mainly from external sources, was the largest contributor to Delhi's pollution. Made up 32% of winter pollution, with 84% of SIA coming from outside Delhi.

🏙️ Pollution Source Apportionment

Average winter pollution sources: SIA (32%), biomass burning (24%), and vehicles (17%).

🤝 Airshed Approach

Policymakers are recognizing the need for a coordinated airshed approach. Involves multiple states to effectively address the pollution crisis.

Summary: Stubble burning is not the sole cause of Delhi's pollution; significant contributions come from transport and external sources, necessitating a collaborative approach to tackle air quality issues.

New rocket, plus moon and Venus missions, herald new beginnings

Building on the moon landing, ISRO is now planning a Venus mission and further moon exploration. A new launcher is being developed as the private sector also begins to take a hand in the space effort. A green propulsion system and low earth orbit satellite developed in the private sector will be seen in action soon

INDIA IN SPACE

Pradeep Mohandas

Preview: The Indian government recently signed off on numerous new projects, including work on a new rocket and new moon and Venus missions. The space programme is thus on the cusp of important new beginnings. India is also preparing to launch the NISAR and Proba-3 satellites, and has received some good news from Astrosat. The private sector is also working on satellite projects of its own.

A slew of approvals

The Union Cabinet on September 18 approved four missions under the 'Gaganyaan' human spaceflight programme and four missions to test technologies for India's first space station, the Bharatiya Antariksh Station 1, by 2028. The Indian Space Research Organisation (ISRO) also added one uncrewed Gaganyaan flight in addition to the planned two.

The Cabinet approved an additional funding of ₹11,170 crore for the four Station-related missions and the additional Gaganyaan flight.

The Cabinet also approved ISRO's development of the Next Generation Launch Vehicle (NGLV) for ₹8,240 crore. This includes the cost of the rocket's first three development flights. ISRO is expected to develop the vehicle in collaboration with industry, so that industry players can seamlessly take over for operational flights when the rocket is tested and ready.

A Polar Satellite Launch Vehicle (PSLV) built by Hindustan Aeronautics, Ltd. and Larsen & Toubro is expected to launch at the end of 2024 or early 2025. Likewise, New Space India, Ltd. is expected to select a private entity to commercialise the LVM-3 rocket.

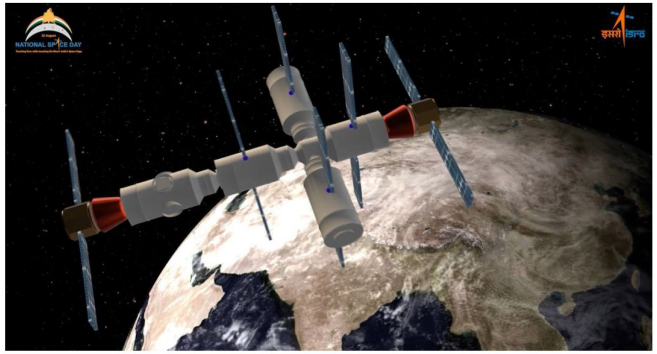
The Cabinet has also approved a scientific mission to Venus and the next Chandrayaan mission to the Moon. The Venus Orbiter Mission is expected to be launched in a window available in March 2028 and will cost ₹1,236 crore. With the mission, scientists hope to study the planet's acerbic surface and atmosphere to understand how different planets of the Solar System evolved.

Chandrayaan-4 and LUPEX

Chandrayaan-4 will be a sample-return mission. Its components will be launched on two separate LVM-3 launch vehicles; they will dock in earth orbit before going to the moon, and land on the surface near the location of Chandrayaan 3. There the mission will scoop up some samples of moon soil and rock and send them back to the earth onboard a bespoke canister. The mission is expected to be launched by 2027 and cost ₹2,104 crore.

The Space Commission also approved a joint moon mission with Japan called the Lunar Polar Exploration Mission (LUPEX). For LUPEX, ISRO is developing a different moon lander than the one it used for Chandrayaan-3, and which it hopes can be used in crewed lunar missions in future.

The Commission also signed off on the development of a third launch pad at Sriharikota, which ISRO will need to test and launch the NGLV.



An artist's rendering of the Bharatiya Antariksh Station in earth orbit. ISRO

SBS and Axiom-4

The Cabinet Committee on Security approved the third phase of the Space Based Surveillance (SBS) missions on October 11. For this, ISRO will build 21 satellites and private companies will build another 31, for ₹26,968 crore in all. This is a significant improvement over the four satellites ISRO built for SBS-1 in 2001 and six for SBS-2 in 2013.

India's astronaut-designate Sudhanshu Shukla had his space suit measured and also underwent pressurisation tests at the SpaceX headquarters. The event marks the official start of his 10-day training programme before he will fly to the International Space Station aboard the Axiom-4 mission next year.

Satellites en route to India

The NASA-ISRO Synthetic Aperture Radar (NISAR) is an earth-observation satellite whose radar antenna reflector recently

The Space Commission also approved a joint moon mission with Japan called the Lunar Polar Exploration Mission. For LUPEX, ISRO is developing a different moon lander than the one it used for Chandrayaan-3

landed in India from the Jet Propulsion Lab in California. Earlier, tests in India had revealed it may experience higher temperatures than expected during its launch. It had to be flown back to receive a protective coating. ISRO is expected to launch NISAR in early 2025 on board a Geosynchronous Satellite Launch Vehicle.

The other mission, Proba-3 from Europe, will study the Sun's corona. It will have two satellites flying in formation: one will gaze at the Sun while the other will block the first satellite's view of the Sun's central area, like creating an eclipse, leaving only light from the corona to hit the cameras. The European Space Agency has said Proba 3 is expected to launch on board a PSLV-XL vehicle on November 29. India previously launched Proba-1 on the PSLV-C3 mission, in 2001.

From the private sector

Manastu Space signed an agreement with Dhruva Space to test its green propulsion technology to power the latter's Launching Expeditions for Aspiring Payloads (LEAP-3) mission. LEAP-3 will carry payloads from different companies in 2025. Manastu is developing a green propulsion system using a hydrogen-peroxide-based fuel. It first tested LEAP on the PSLV-C58 mission on January 1 this year.

Bellatrix Aerospace unveiled 'Project 200', a prototype for a satellite that can fly at an altitude of 200 km. a.k.a. the ultra-low earth orbit.

Ananth Technologies became the first private Indian company to assemble, integrate, and test two Space Docking Experiment (SpaDEx) satellites for ISRO at the company's facility in Bengaluru. The satellite was then sent to the U.R. Rao Satellite Center (URSC) in the same city.

Space science

Scientists have found that the crater where Chandrayaan-3 landed is older than the South Pole Aitken Basin, itself 4.2-4.3 billion years old.

This was based on data from the Optical High-Resolution Camera onboard the Chandrayaan-2 orbiter and navigational cameras on board Pragyaan, the Chandrayaan-3 rover.

Astrosat, India's first multi-wavelength space observatory, was built with a mission life of five years but has now operated for nine. Based on fuel readings, it is expected to last for another two years. The data collected by the observatory has been the basis of more than 400 published papers.

(Pradeep Mohandas is a technical writer and space enthusiast in Pune. pradeep.mohandas@gmail.com)

('India in Space' will collect and analyse developments in the country's space, spaceflight, and allied sectors.)

THE GIST

Four missions under the 'Gaganyaan' programme and four to test technologies for an Indian space station have been approved. ISRO also added one uncrewed Gaganyaan mission

The Cabinet approved ISRO's development of the Next Generation Launch Vehicle for ₹8,240 crore. ISRO is expected to develop the vehicle with industry, so they can take over for operational flights

Approval has been granted for a mission to Venus and the next Chandrayaan mission. The Venus Orbiter is expected to be launched in March 2028. Scientists hope to study the planet's acerbic surface

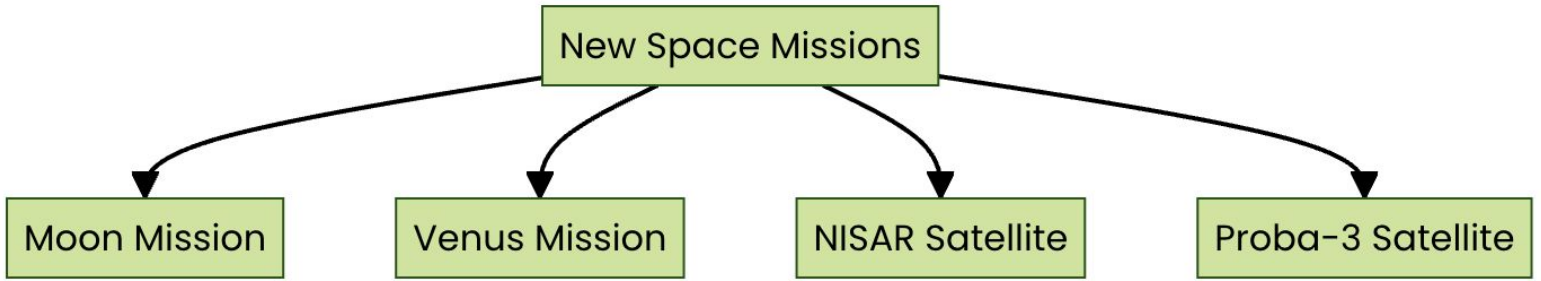
As part of an expansion of Space Based Surveillance;, ISRO will build 21 satellites and private companies will build another 31, at a cost of ₹26,968 crore. ISRO built four satellites for SBS-1 in 2001 and six for SBS-2 in 2013

Topic →India's Expanding Space Program 🚀

🚀 New Space Missions

The Indian government has initiated several new space projects.
Missions include explorations to the Moon and Venus.
Upcoming launches: NISAR and Proba-3 satellites.

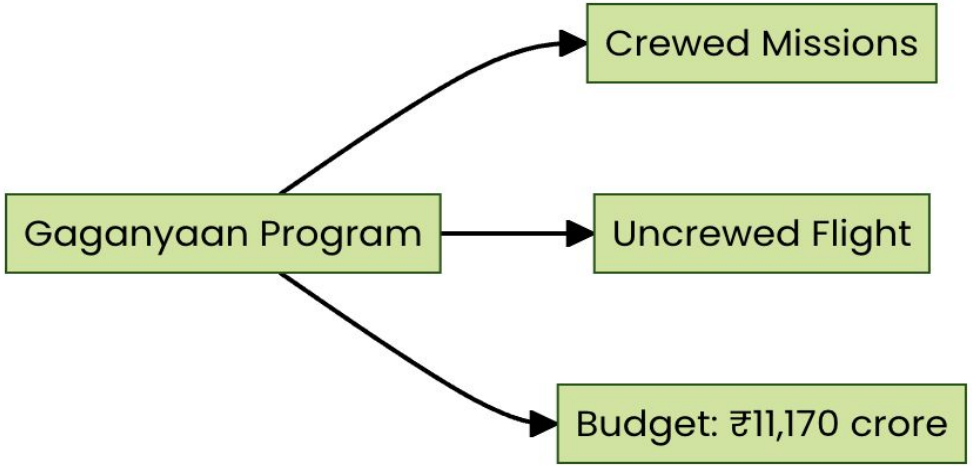
Mission Overview:



Gaganyaan Program

Union Cabinet approved four missions under the Gaganyaan human spaceflight program.
Includes an additional uncrewed flight.
Total budget: ₹11,170 crore.

Gaganyaan Program Structure:



💰 Funding for Launch Vehicles

Additional funding of ₹8,240 crore for the Next Generation Launch Vehicle (NGLV).
Development in collaboration with the private sector.

🌕 Chandrayaan-4 Mission

A sample-return project set to launch by 2027.
Aims to collect lunar soil and rock samples.
Project cost: ₹2,104 crore

🌌 Lunar Polar Exploration Mission (LUPEX)

Joint mission with Japan to explore the Moon.
ISRO developing a new lander for potential crewed missions.

🛰️ Space Based Surveillance (SBS)

Third phase approved, involving 21 satellites by ISRO and 31 by private companies.
Total budget: ₹26,968 crore

🧑‍🚀 Astronaut Training

Sudhanshu Shukla, India's astronaut-designate, is training for the Axiom-4 mission.
Mission will take him to the International Space Station.

Recent Advancements in India's Space Sector

🚀 Manastu Space Agreement

Agreement with Dhruva Space: Manastu Space has signed a collaboration to test green propulsion technology for the LEAP-3 mission, scheduled for 2025.

🌱 Green Propulsion Development

Hydrogen-Peroxide System: Manastu is working on a hydrogen-peroxide-based propulsion system, with initial tests on the PSLV-C58 mission on January 1, 2023.

🛰️ Bellatrix Aerospace's Project 200

Prototype Satellite: Bellatrix Aerospace introduced 'Project 200', a satellite prototype for ultra-low earth orbit at 200 km altitude.

🛠️ Ananth Technologies' Milestone

Satellite Assembly: Ananth Technologies is the first private Indian company to assemble, integrate, and test two SpaDEx satellites for ISRO, delivered to the U.R. Rao Satellite Center.

🌌 Chandrayaan-3 Crater Discovery

Ancient Crater: The landing site of Chandrayaan-3 is older than the South Pole Aitken Basin, dating back 4.2-4.3 billion years.

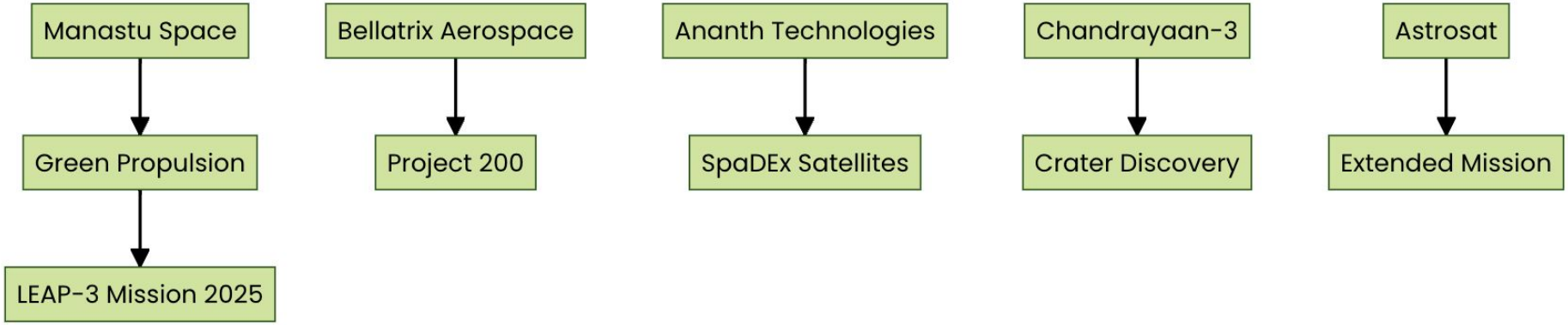
📊 Astrosat's Extended Mission

Mission Longevity: Astrosat, India's first multi-wavelength space observatory, has surpassed its five-year mission, operating for nine years and expected to continue for two more, contributing to over 400 research papers.

🔭 Data Sources

Chandrayaan-3 Findings: Data from the Optical High-Resolution Camera on Chandrayaan-2 and Pragyaan rover's navigational cameras informed the findings about the Chandrayaan-3 landing site.

Space Sector Developments:



Summary: India's space sector is advancing with new agreements, satellite prototypes, and significant discoveries from Chandrayaan missions.

WHAT IS IT?

Carbon credit: the right to emit

Vasudevan Mukunth

Carbon credits are an important new instrument of climate finance.

The green-coloured piece of paper printed by the Reserve Bank of India and circulated by the government is worth 20 rupees. The person who possesses it can buy a packet of biscuits by transferring that value to the seller. There are different ways to acquire such pieces of paper. For example, people do different kinds of jobs to earn money. Carbon credits are similar. Just like possessing the green note means you possess 20 rupees of value, possessing one carbon credit gives you a licence to emit 1,000 kg of carbon dioxide (or equivalent).

You can earn a carbon credit by removing 1,000 kg of carbon dioxide from the environment and submitting the proof to a government or suitable certifying agency. Once they sign off, you can sell your credit to potential buyers. Governments around the world have decided which types of work can earn carbon credits, who can certify them, and who can buy them. Such projects include most renewable energy installations, certain forests, and carbon capture facilities. The Paris Agreement set up an international carbon market as part of helping countries meet their emissions targets.

The Thwaites glacier in Antarctica. No matter how much the world cuts back on carbon emissions, a key and sizeable chunk of Antarctica is essentially doomed to an "unavoidable" melt, a new study has found. AP

An important problem with carbon credits is that the certifying agencies struggle to verify whether sellers have actually removed 1,000 kg of carbon dioxide. How countries can fix this problem is an important agenda item at the COP29 climate talks in Baku in November.

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Topic-- > Carbon credit

🌍 Carbon Credits as Climate Finance: Carbon credits are a new instrument aimed at financing climate initiatives.

💵 Value Representation: A carbon credit represents the right to emit 1,000 kg of carbon dioxide, similar to how a 20 rupee note represents monetary value.

🌱 Earning Carbon Credits: Individuals can earn carbon credits by removing 1,000 kg of CO_2 from the environment and providing proof to certifying agencies.

🏢 Certification and Sale: Once certified, carbon credits can be sold to buyers, with specific projects like renewable energy and carbon capture being eligible.

🌐 International Framework: The Paris Agreement established an international carbon market to help countries meet their emissions targets.

🔍 Verification Challenges: Certifying agencies face difficulties in verifying the actual removal of CO2, which is a significant issue for the carbon credit system.

📅 Upcoming Discussions: The verification problem will be a key topic at the COP29 climate talks in Baku in November.

Summary: Carbon credits serve as a financial tool for climate action, allowing individuals to earn and sell credits for CO2 removal, but face verification challenges that will be addressed at COP29.

Mapping →

Thwaites Glacier is an unusually broad and vast Antarctic glacier located east of Mount Murphy, on the Walgreen Coast of Marie Byrd Land.

Sustainability science for FMCGs

Shambhavi Naik

Takshashila Institution, Bengaluru. Views are personal

L.S. Shashidhara

National Centre for Biological Sciences, Bengaluru. Views are personal

India's new PPP initiative, the Anusandhan National Research Foundation (ANRF), established to promote research and development, and the recently announced BioE3 (Biotechnology for Economy, Environment and Employment) policy emphasise the need for academia-industry partnership; and the role of the bioeconomy in driving the economy while honouring India's commitment to sustainable development and climate action. Specifically, the BioE3 policy notes the need to convert chemical-based industries to sustainable bio-based industrial models. It also provides an opportunity to revisit the impact of new technologies on existing industries such as Fast-Moving Consumer Goods (FMCGs).

Reducing palm oil in soap

The soap industry globally, for example, is a major contributor to greenhouse gas emissions and loss of biodiversity. The manufacturing of soap depends heavily on palm oil. About 90% of palm plantations are grown in Borneo, Sumatra, and the Malay Peninsula, where its lucrative production has led to replacing forested lands with palm oil fields. Although this deforestation has been well documented, replacing palm oil in soaps and other FMCG products has been difficult. For one, palm has relatively higher yields as compared with other vegetable oils, making it more lucrative for farmers and cheaper for consumers. Palm oil also accounts for about 40% of the global annual demand for vegetable oil.

However, new emerging technologies may provide avenues to replace or at least reduce palm oil consumption in soaps. Palm oil is the primary source of fatty acids that perform two functions in a soap bar —15-20% of the lower chain fatty acids contribute to the surfactant/cleansing function of the soap, while most of the longer chain fatty acids only provide structure to the bar. Synthetic biotechnologies may be able to create artificial fatty acid chains that can replace the functionalities of palm oil, particularly those providing structure to the bar. Alternately, the so-called 'structuring portion of the Total Fatty Matter', which provides no consumer benefit, could be replaced with other local plant or bio-based materials such as plant-based polysaccharides. Additionally, with the total amount of 'hard soap' reduced, other benefit agents like antimicrobial peptides or other biologically active molecules could be added to the soap bar to improve its germ-protection function or preferably molecules which boost the skin's immunity and provide germ protection.

This will require strong support from government and civil society. It would mean the development of solutions across the soap value chain, be it bio-based or bio-synthetic materials that could replicate the brick-and-mortar structure of the soap bar or packaging innovations that can reduce/eliminate plastic use. The recent PPP initiative under ANRF, linked seamlessly with the BioE3 policy, could support such partnerships through funding and by recognising the need to reinvent legacy products in addition to introducing new ones.

FMCGs should be a priority target sector for ANRF, the new public-private partnership initiative, and the BioE3 policy of the government

Locally grown palm oil

Until bio-synthetic or bio-engineered products become a reality, every day-use products like soaps will depend on domestic and international sustainable palm oil plantations. The Government of India launched the National Mission on Edible Oils-Oil Palm in August 2021 with the aim of increasing the oil palm production area to 10 lakh ha. and boosting crude palm oil production to 11.20 lakh tonnes by 2025-26. It is important that such plantations not only adhere to the policy of 'No Deforestation, No Peat', but that they are also carefully selected so that they don't disrupt the surrounding biodiversity. A comprehensive ecological research programme to understand the long-term impact of these monocultures in the context of India's biodiversity is also a strong need, along with regenerative agriculture practices, working with smallholder farmers.

The purchase of locally grown sustainable palm oil and investments in innovation to replace imported palm oil come at a cost, which, when borne by the company, may have to be passed onto the consumer. In a competitive market, this can mean the loss of market share. Government support through funding for research or other fiscal incentives encourage such sustainable practices and help companies innovate in this space.

Finally, the move to reduce palm oil use in soaps will require regulatory support. Current toilet soap grades are decided based on the fatty material present in the soap. This creates a false equivalency in the government's and consumer's mind that the higher the fatty material in the soap, the better the product's quality. Many publications disprove of this. Regulatory requirements for soap grades should move away from this old 'vertical' compositional standard based on a single material and embrace more horizontal and performance-based standards as those which exist in developed markets and incentivise newer technologies and methodologies linked to consumer benefit, product safety, and environmental sustainability. Furthermore, mandatory labelling of products on a sustainability scale based on their procurement and production practices can also help consumers make informed decisions.

The ANRF and the BioE3 policy are the right ways of moving towards a bio-based economy linked to a strong partnership between academia and industry. Products of everyday use might be a great first place to start, to make a real impact in terms of being both sustainable and self-reliant.

Topic → India's New Initiatives and Sustainable Practices

🇮🇳 India's New Initiatives

Anusandhan National Research Foundation (ANRF): Aims to boost research and development through partnerships between academia and industry.

🌱 BioE3 Policy (BioE3 stands for Biotechnology for Economy, Environment, and Employment)

Focuses on shifting from chemical-based industries to sustainable bio-based models.
Highlights the bioeconomy's role in economic growth and climate action.

🧼 Soap Industry Impact

The global soap industry is a significant contributor to greenhouse gas emissions and biodiversity loss.
This is mainly due to its reliance on palm oil.

🌴 Palm Oil Dependency

Palm oil accounts for about 40% of global vegetable oil demand.
Its high yield makes it difficult to replace in soap production.

🔬 Emerging Technologies

New synthetic biotechnologies may provide alternatives to palm oil.
These include creating artificial fatty acid chains or using local plant materials to maintain soap structure.

🛠️ Value Chain Development

Innovations in the soap value chain are crucial for reducing environmental impact.
This includes the use of bio-based materials and sustainable packaging.

🤝 Support for Transition

Strong support from government and civil society is essential.
This backing is crucial for developing sustainable solutions and reinventing legacy products in the soap industry.

Sustainable Palm Oil in India

Key Initiatives and Considerations

🌱 Sustainable Palm Oil: Essential for products like soaps until bio-synthetic alternatives are available.

🇮🇳 National Mission on Edible Oils: Aims to expand oil palm production to 10 lakh hectares and increase crude palm oil output to 11.20 lakh tonnes by 2025-26.

🌳 Environmental Considerations: Adherence to 'No Deforestation, No Peat' policies is crucial to protect biodiversity.

💰 Cost of Sustainability: Local sustainable palm oil may raise costs, impacting market share.

- 🏛️ Government Support: Financial backing and incentives can drive sustainable practices and innovation.

  📜 Regulatory Changes Needed: Reform soap grading standards to focus on performance and sustainability.

  🏷️ Consumer Awareness: Mandatory sustainability labeling can empower informed consumer choices.

Summary

The Indian government is promoting sustainable palm oil production with a focus on environmental protection, regulatory reform, and consumer awareness to support a bio-based economy

The rise and fall of P2P lending in India

Overstepping role: P2P exchanges had begun acting like a bank, drawing the ire of RBI. GETTYIMAGES/ISTOCK

Piyush Shukla

After the Reserve Bank of India's clampdown on peer-to-peer (P2P) exchanges in August this year, the industry's asset under management (AUM) plummeted by 35% – from an estimated ₹10,000 crore to ₹6,500 crore. No surprises there, since the RBI's restrictions targeted features that were most attractive to potential investors – tenure-linked assured minimum returns and liquidity options – apart from mandating T+1 settlement cycle. A P2P platform's role is limited to facilitating transactions between lenders and borrowers without participating directly in the lending or borrowing process. While opinions differ on the industry's ability to comply with the new norms, *businessline* takes a look at the past, present and likely future of P2P lending in India.

Informal lending

Talk of regulating P2P lending first emerged in 2016, to curb informal money-lending. Citing the global pickup in P2P lending and newer entrants in India, the RBI floated a discussion paper on whether regulation was needed or not.

The arguments against included inadvertently lending credibility to P2P lending, with the stamp of regulation; stifling growth; and the absence of any immediate systemic risk from the nascent sector. After the feedback from stakeholders, the RBI in 2017 issued master directions on P2P lending in India, specifying the scope of activities for the lenders, eligibility criteria, and transparency and pricing disclosure requirement, among others.

What went wrong?

According to an RBI official, who requested anonymity, P2P exchanges began acting like a bank, drawing the ire of the regulator. They pocketed the spread between the borrowing rate and the interest that a lender charged on the platform. The RBI's restrictions soon followed. The regulator declared that P2P exchanges cannot utilise the funds of one lender to replace those of another, effectively killing the secondary market. It also stressed that P2P players must disclose their fees at the time of lending.

The RBI also disallowed the practice of matching and mapping participants within a closed user group, whether through an outsourcing agency or otherwise.

What lies ahead?

There are divergent views on the future of P2P lending in India. A large P2P exchange has stopped onboarding new customers since August 16, leading to 30-35 % loss in AUM, an official said. "RBI officials are visiting our offices to assess whether we are in compliance with the new norms. If some of the secondary market features are not revived, the industry may see a sharp fall in volumes. Large players like us are thinking of giving up the licence," a company official said.

But not all are pessimistic. Bhavin Patel, founder and CEO, LenDenClub, says in any regulated business some players will push boundaries till the industry reaches product-market fit. "Auto-lending were discontinued, as it needed flow change, but it did not affect customers," he said.

(The writer is with The Hindu businessline)

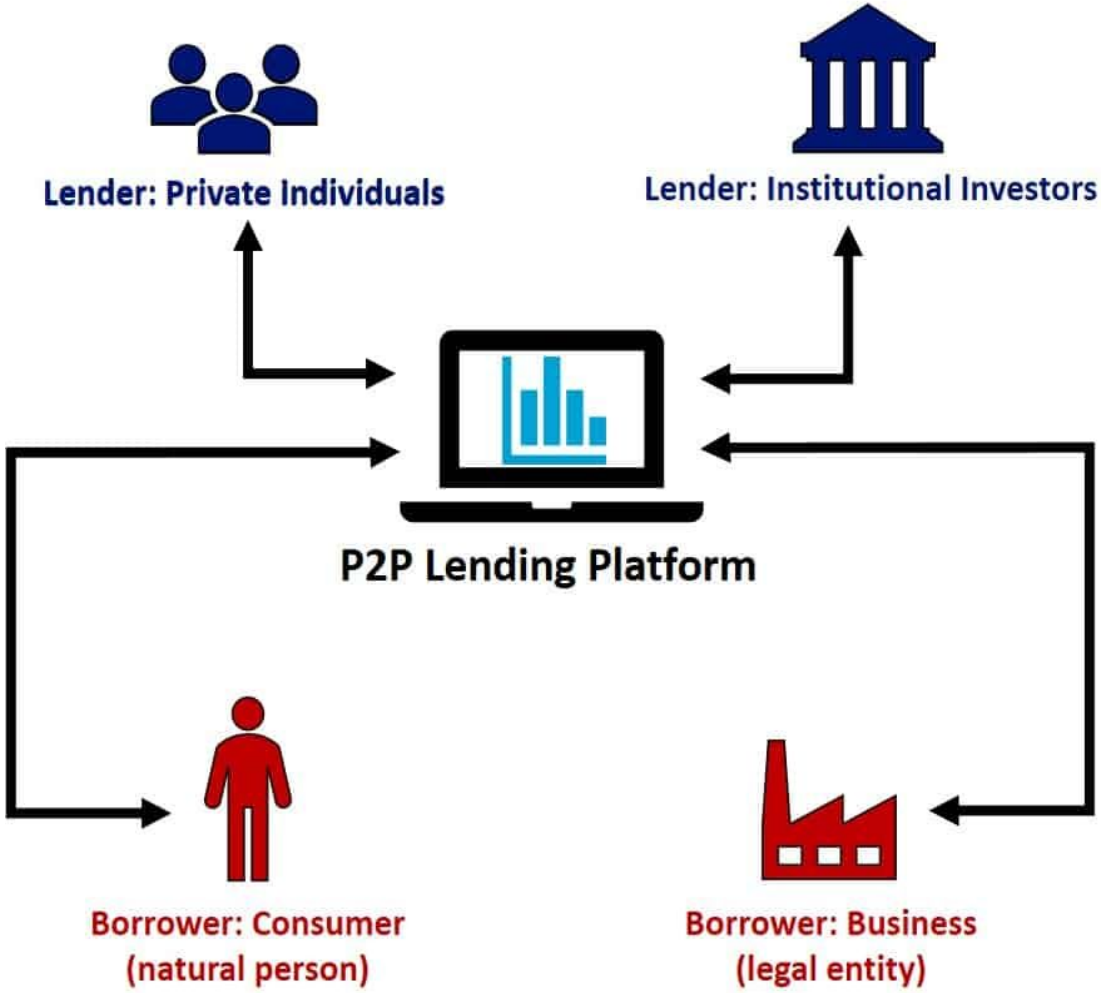
Key Developments in P2P Lending

📉 AUM Decline: The asset under management (AUM) in the P2P lending sector experienced a 35% drop, decreasing from ₹10,000 crore to ₹6,500 crore due to the RBI's restrictions.

🔒 RBI Restrictions: The Reserve Bank of India (RBI) introduced regulations affecting attractive features of P2P lending, such as assured returns and liquidity options, along with a T+1 settlement cycle.

🏦 Role of P2P Platforms: These platforms enable transactions between lenders and borrowers without directly engaging in the lending process.

📜 Regulatory History: Discussions on regulating P2P lending began in 2016, culminating in the RBI issuing master directions in 2017 to ensure transparency and establish eligibility criteria.


Lender: Private Individuals
Lender: Institutional Investors
P2P Lending Platform
Borrower: Consumer
(natural person)
Borrower: Business
(legal entity)

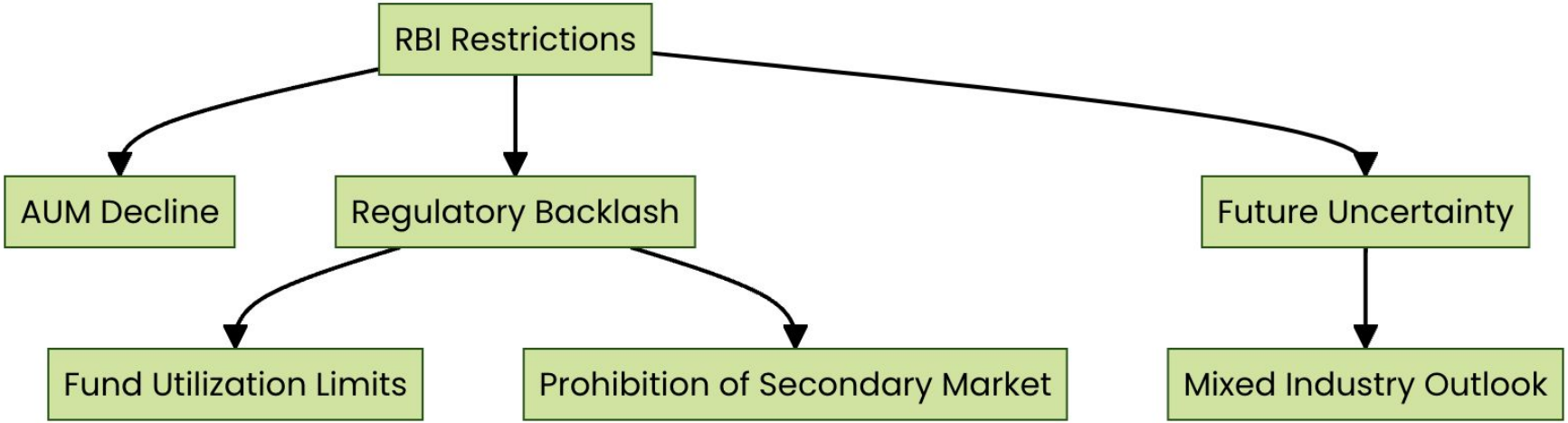
- ⚖️ Regulatory Backlash: P2P exchanges were scrutinized for operating like banks, leading to restrictions on fund utilization and a ban on secondary market practices.

  🔍 Future Uncertainty: The future of P2P lending remains uncertain, with some companies stopping new customer onboarding and concerns about compliance with new norms.

  🌟 Mixed Outlook: While some industry players are pessimistic about the future, others believe that regulation could lead to a better product-market fit over time.

Summary: The RBI's recent actions against P2P lending have caused a significant decline in AUM and raised concerns about the industry's future, with mixed opinions on the regulatory impact.

P2P Lending Regulatory Impact:



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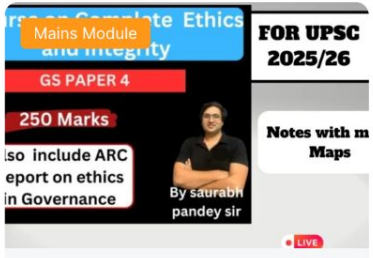

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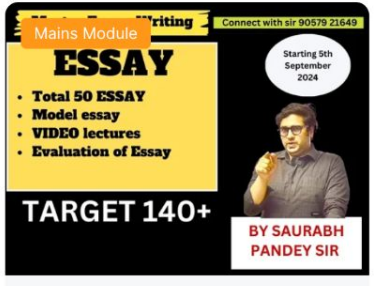

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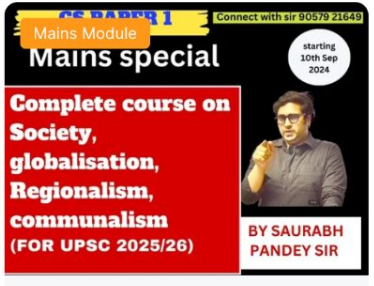

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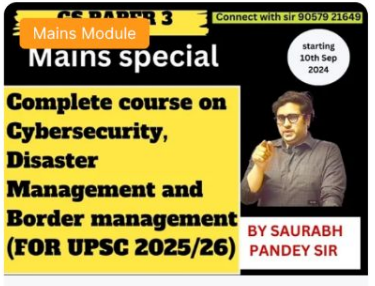

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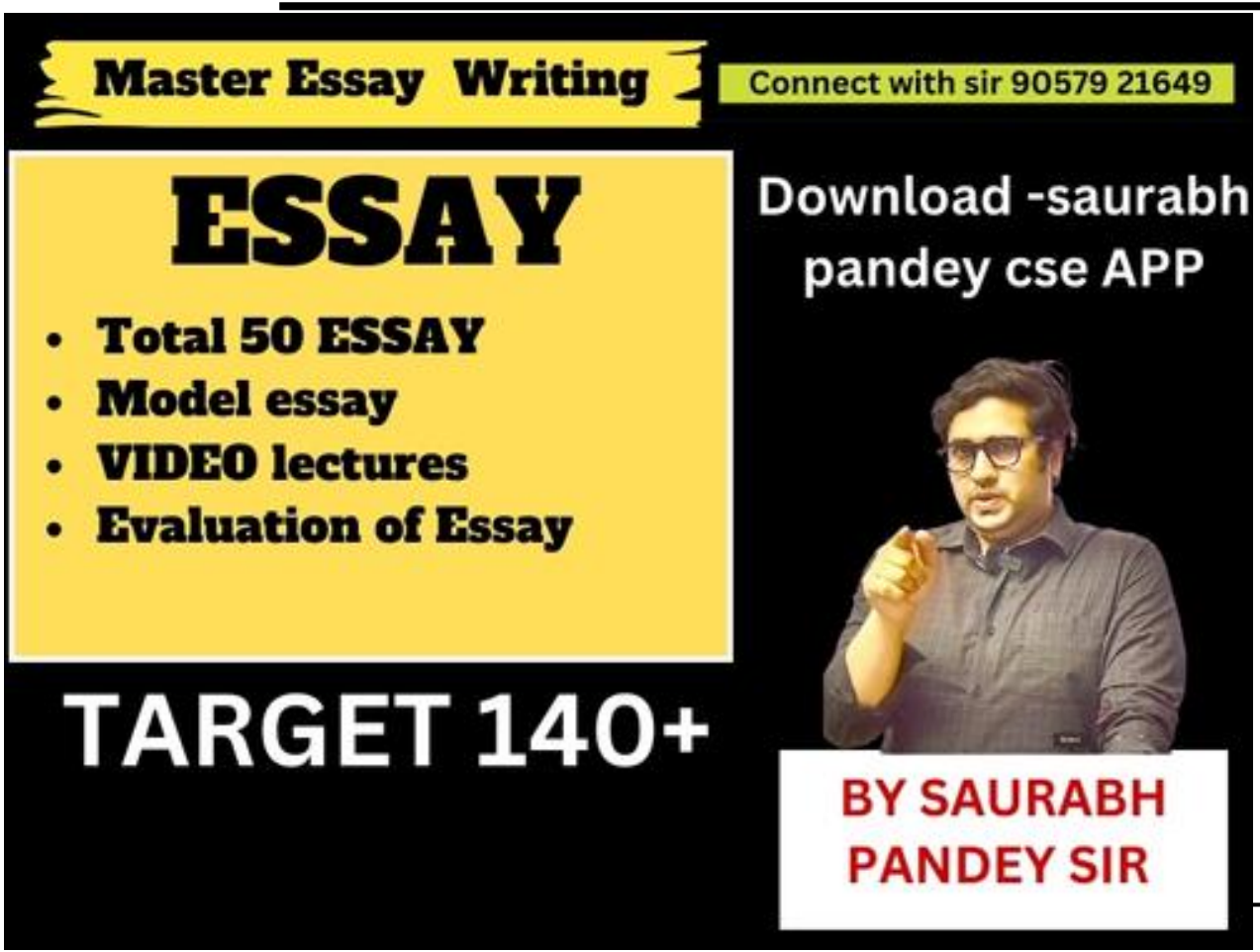
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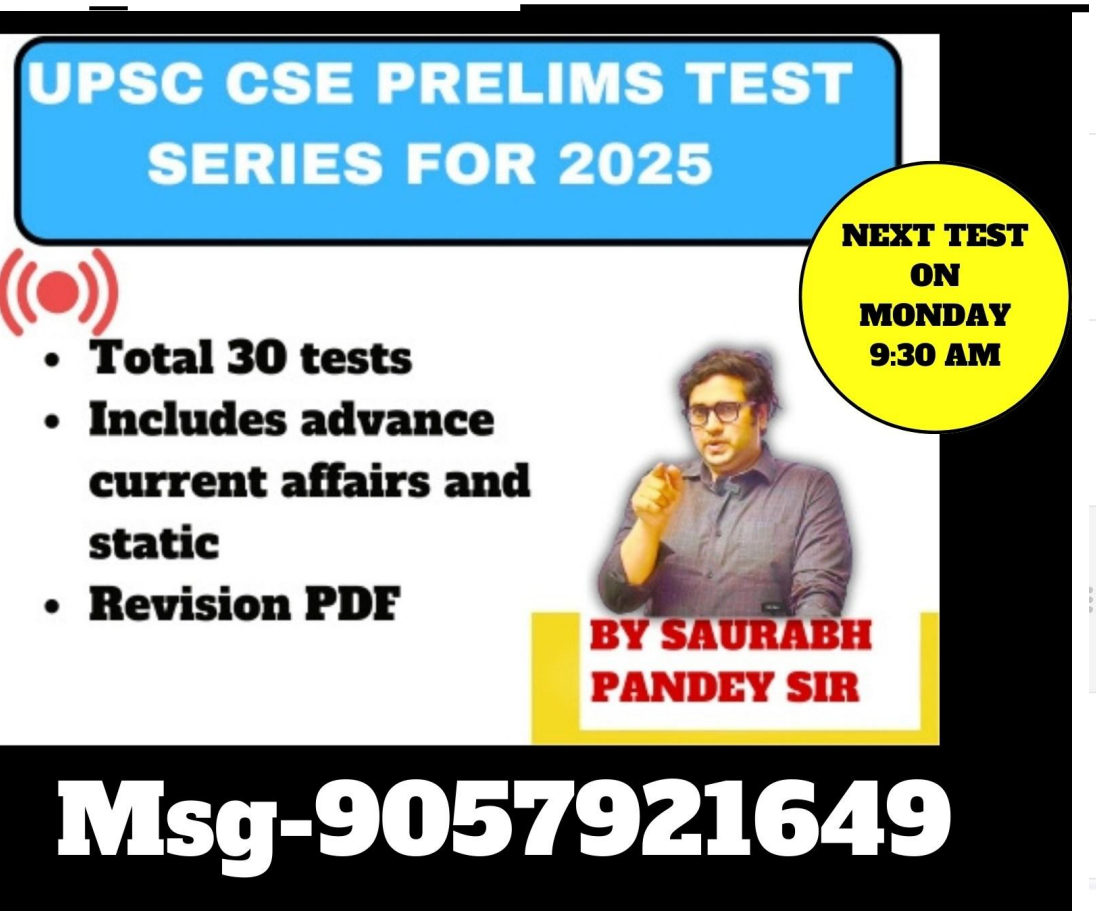

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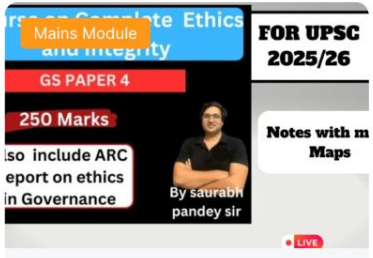

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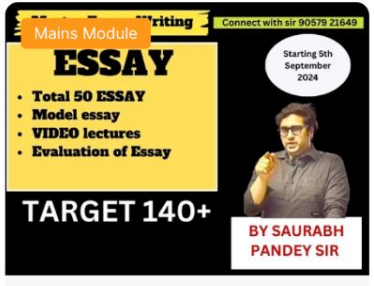

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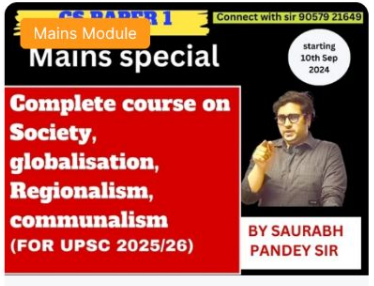

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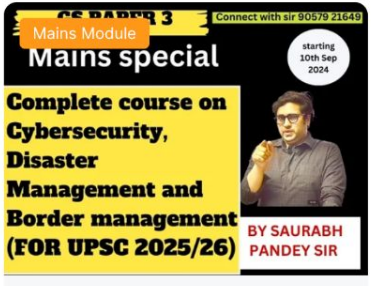

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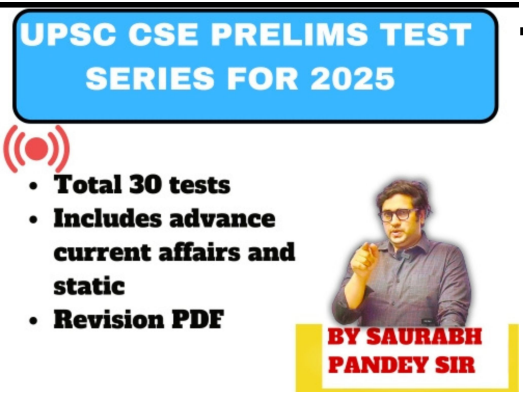

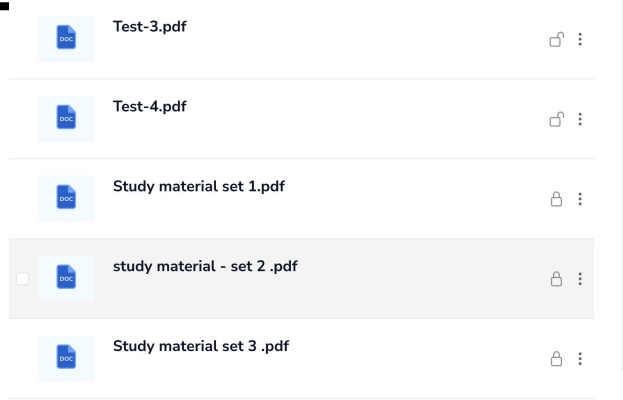

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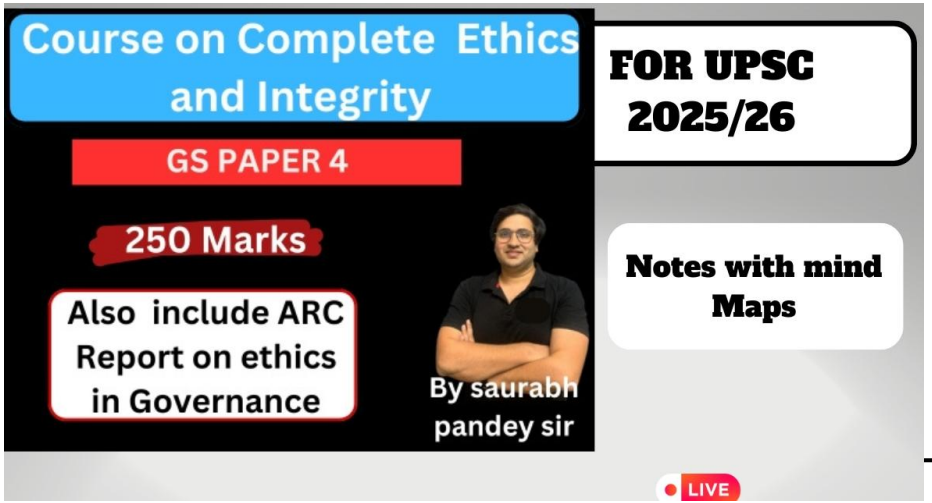

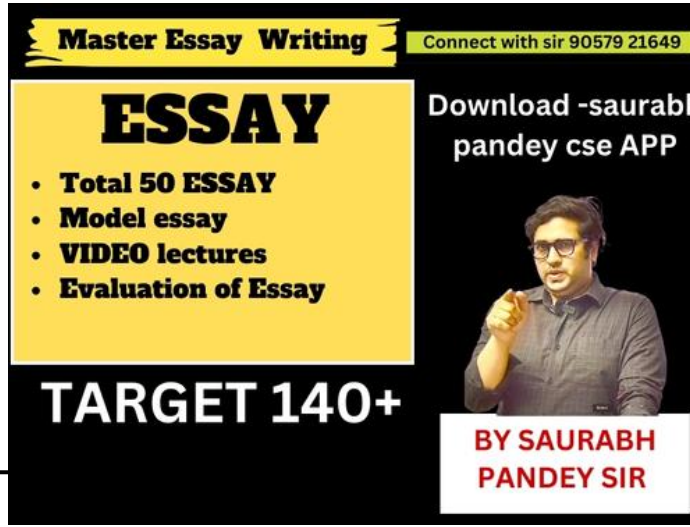

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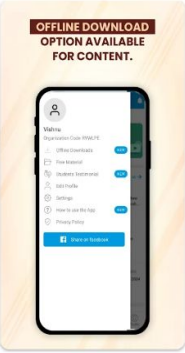

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