The Success of ISRO's SpaDeX Mission and Its Implications for the Future

Two ISRO satellites dock successfully for the second time

The Hindu Bureau
BENGALURU

The Indian Space Research Organisation (ISRO) has successfully executed the second docking of the two satellites – SDX01 (Chaser) and SDX02 (Target) – that are part of the Space Docking Experiment (SpaDeX) mission, Union Minister of State for Science and Technology Jitendra Singh said on Monday.

"Glad to inform that the second docking of satellites has been accomplished successfully. As informed earlier, the PSLV-C60 / SPADEX mission was successfully launched on 30 December 2024. Thereafter the satellites were successfully docked for the first time on 16 January 2025 at 06:20 AM and successfully undocked on 13 March 2025 at 09:20 AM. Further experiments are planned in the next two weeks," the Minister posted on X.

Docking satellites

Earlier this year, India became the fourth country after the U.S., Russia, and China to conduct the docking experiment.

The SpaDeX mission is an important project by the ISRO. It is designed to develop and demonstrate the technology needed for spacecraft rendezvous, docking, and undocking using two small satellites.

The demonstration of this technology is essential for future missions, such as sending an Indian astronaut to the moon, returning samples from the moon, and the building and operation of an Indian space station. The other aims of the mission include demonstration of the transfer of electric power between the docked spacecraft, which is essential for future applications, such as in-space robotics, composite spacecraft control, and payload operations after undocking.

The ISRO has executed the second docking of the two satellites Chaser and Target.

Understanding the SpaDeX Mission

The SpaDeX mission was initiated with specific objectives aimed at revolutionizing satellite operations.

Objectives of the SpaDeX Mission

To demonstrate advanced docking technology between satellites.

To explore the possibilities of power transfer between docked satellites.

Overview of the SDX01 and SDX02 Satellites

SDX01 and SDX02 are the first of their kind to engage in docking operations, showcasing India's technological prowess.

Importance of Docking Technology in Space Missions

Docking technology is crucial for future missions, enabling satellite servicing, maintenance, and the potential for in-space construction.

What is Satellite Docking?

Satellite docking involves two spacecraft coming together to connect and function collaboratively in space.

Technical Aspects of the Docking Mechanism

The docking mechanism includes automated systems that ensure alignment and secure connection.

The Role of Automation in Docking Operations

Automation minimizes human error and enhances efficiency during complex docking maneuvers.

The Journey of the SpaDeX Mission

The SpaDeX mission's journey has been marked by significant milestones.

Launch Details: PSLV-C60

The SpaDeX mission was launched aboard the PSLV-C60, signifying ISRO’s ongoing commitment to innovation.

First Docking: A Historic Moment

The first successful docking showcased India's capabilities in autonomous satellite operations.

The Second Docking: Achievements and Challenges

The second docking was marked by the successful transfer of power between SDX01 and SDX02, highlighting the mission's achievements.

The SpaDeX mission encourages collaborative projects between countries, fostering a spirit of cooperation in space exploration.

Bullseye! Galaxy with nine rings may reveal dark matter secrets

Researchers found signs that a blue dwarf galaxy had passed through the centre of the Bullseye Galaxy, and the interaction could have led stars to pile up and form the rings; the Bullseye could evolve into a giant low surface-brightness galaxy, which is important in the study of dark matter

Shreejaya Karantha

A team of international researchers recently discovered a galaxy with nine rings. They called it a "serendipitous discovery" because previous ringed galaxies have only displayed two or three rings at best.

Using the Hubble space telescope, the team confirmed the presence of eight rings, while data from the W.M. Keck Observatory in Hawaii confirmed the existence of the ninth ring.

This unusual galaxy has been named LEDA 1313424 but its common name is more memorable: the Bullseye Galaxy. The story of how its rings could have formed may render it more memorable.

A thin trail of evidence

When the researchers analysed the data from the space telescope and the observatory, they found signs that a blue dwarf galaxy, located at the immediate centre-left in an image, had passed through the centre of the Bullseye Galaxy about 50 million years ago. They have said this interaction gave the Bullseye Galaxy its unique shape.

As evidence of this interaction, the team reported a thin trail of gas connecting the two galaxies even though they are separated by 130,000 lightyears (or 1.22 billion billion km). This is all the more remarkable considering the Bullseye Galaxy is nearly 2.5-times larger than the Milky Way with a diameter of 2,50,000 light-years.

On cosmic timescales, galaxies crash or barely miss one another relatively often. But even then it is very rare for one galaxy to literally dart through the core of another. The blue dwarf galaxy's straight path through the Bullseye Galaxy caused gas in the latter to ripple back and forth in waves, creating new places of star formation. The interaction didn't alter the orbits of individual stars but it caused groups of stars to pile up and form the distinct rings over millions of years.

The Bullseye Galaxy will continue to evolve and, as a result, will have these star-filled rings only for a short interval of time. This means the astronomers captured an intriguing image of a multi-ring galaxy in a special moment.

For other astronomers, however, the intrigue may run even deeper: the Bullseye Galaxy also contains signs that it could one day evolve into a giant low surface-brightness (GLSB) galaxy, which are important in the study of dark matter.

Their findings were published in February in *The Astrophysical Journal Letters*.

Cosmic oddballs

Low surface-brightness galaxies have a shortage of elements heavier than hydrogen and helium. They also have

The Hubble Space Telescope image of the Bullseye Galaxy, processed by the European Space Agency with additional cropping and contrast adjustments made to highlight some of the low surface brightness structures. NASA/ESA

to understand this still-mysterious form of matter.

These galaxies also have a more uniform distribution of mass near their centres – which is at odds with the standard model of cosmology, which predicts the centres of galaxies to be a lot more dense. This discrepancy is another challenge scientists are trying to overcome with more data and better theories.

Giant low surface-brightness (GLSB) galaxies are the largest of the low surface-brightness galaxies. All GLSB galaxies are truly colossal. Their most famous member, called Malin 1, is roughly 6.5-times wider than the Milky Way and one of the largest spiral galaxies known.

"GLSB galaxies are spiral galaxies that possess very diffuse or low surface

> The mass of black holes at the centers of these (GLSB) galaxies is also lower than usual, meaning they aren't fully evolved
>
> **MOUSUMI DAS**
> Professor, Indian Institute of Astrophysics, Bengaluru

at the centers of these galaxies is also lower than usual, meaning they aren't fully evolved.

Given the various ways in which LSBs deviate from the patterns that unite other galaxies, astronomers have struggled to understand them. Their simulations, which are based on the standard model of cosmology, predict these galaxies' hydrogen content, the surface brightness of their disks, and their density profiles – only for them to be at odds with what astronomers see in the data collected by telescopes and observatories.

In science, such a disagreement means the scientific theories are in some way incomplete.

There are some ideas to resolve the disagreement. Das offered one example: "Previous studies have indicated that the material within them expands outward, creating a large, disk-like shape with a lo density," and eventually GLSB galaxies.

"And their disks are not dense enough to easily form stars."

Studying GLSB galaxies in more detail could help check whether this idea, and others like it, could be true. This in turn makes confirming whether newfound galaxies like the Bullseye could be GLSB galaxies in future more important.

New insight

The international team of researchers reported that the size of the Bullseye Galaxy's extended disk and hydrogen content relative to its stellar mass are comparable to that of other GLSB galaxies, and that it's likely to become or in future. But in their paper they were also careful to add that more analysis is still required.

Ms. Das said, "The transition from a ringed galaxy to a GLSB galaxy is still a theory that is being explored" and that "past simulations have demonstrated tha some GLSB galaxies may have formed from head-on collisions between disk galaxies", as in the Bullseye Galaxy's cas But she also said most GLSB galaxies are found in isolation – i.e. not surrounded by other galaxies nearby – making it less likely for them to have experienced such collisions. In other words, confirming Bullseye's candidacy as a pre-GLSB galax is complicated.

A 10th ring?

At this moment, astronomers have an opportunity to obtain the first direct observational evidence of a collisional ring galaxy turning into a GLSB galaxy – or not.

Ms. Das expressed optimism because, she said, the new study offers compellin evidence of an evolutionary link betwee the Bullseye Galaxy and GLSB galaxies.

The authors of the new study have als said the Bullseye Galaxy may once have had a 10th ring that has since faded. The added that over billions of years followin the collision, the nine rings will also slowly drift out and fade away, leaving behind a GLSB galaxy.

Ms. Das added that more information about the formation of GLSB galaxies could reveal new insights into the distribution of dark matter in the universe. Eventually, "if the [current]

Bullseye Galaxy:

Recently, a team of international researchers made a **serendipitous discovery** of a galaxy unlike any other, aptly named the **Bullseye Galaxy** (LEDA 1313424).

What Makes the Bullseye Galaxy Unique?

The Bullseye Galaxy stands out not just for its **nine rings**, but also for the tantalizing questions it raises about its formation. Each ring may have emerged from past cosmic events, such as galactic collisions or gravitational interactions. Researchers speculate that these rings are an intricate dance of cosmic forces, making this galaxy a **stellar marvel**.

Comparison with Other Ringed Galaxies:

Traditional ringed galaxies often exhibit only a couple of rings.

The Bullseye Galaxy's **nine rings** present a unique opportunity for study

Researchers theorize that these rings could have resulted from a **cosmic collision**, where gas and dust from neighboring galaxies merged.

Bullseye Galaxy, they predict that it may one day evolve into a **giant low surface-brightness galaxy**. This transformation could play a pivotal role in understanding dark matter

Significance of Low Surface-Brightness Galaxies:

They contain fewer elements heavier than hydrogen and helium.

Their future evolution may provide insights into the nature of dark matter.

giant low surface-brightness (GLSB) galaxy. These galaxies are known for their:

Element Deficiency: A scarcity of elements heavier than hydrogen and helium.

Star Formation Paradox: Although they contain vast disks of hydrogen, they exhibit minimal star formation.

Dark Matter Presence: GLSB galaxies are believed to harbor significant amounts of dark matter, making them key subjects for research.

low-surface brightness galaxies, often exhibit:

Lower-than-expected black hole masses

Uniform mass distributions that challenge existing cosmological models.

A traditional temporary pacemaker requires invasive open heart or endovascular surgical methods to implant and remove. Representative illustration. GETTY IMAGES/ISTOCKPHOTO

Tiny device enhances pacemaker's abilities

Navaneeth Krishna V.

Scientists at Northwestern University in the U.S. have engineered a pacemaker smaller than a grain of rice. The makers of the device say it can be implanted in a non-invasive procedure and that it doesn't need an external power source to operate. The team published its paper in *Nature* on April 2.

The device opens the possibility of replacing other, more cumbersome medical procedures, especially for infants born with congenital heart disease and people recovering from cardiac surgery.

People who have just undergone heart surgery need temporary pacemakers – as do infants born with congenital heart disorders. Both groups are prone to declining cardiac health and slow heart rates for some time.

The biggest highlight of the new device is its small size – so small that its developers have said it can simply be injected into the heart. While scientists at Oklahoma University had previously built a small pacemaker, the new one from Northwestern University is reportedly smaller by 2.5 times.

A traditional temporary pacemaker requires invasive open heart or endovascular surgical methods to both

The new device has been made

Bioresorbable Materials in Medical Devices

Definition

Bioresorbable materials are substances that **dissolve** or are **absorbed** by the body over time.

🏥 Applications

Widely used in **medical devices** and **implants** such as **stents** and **sutures**.

Designed to **avoid removal surgeries**.

✅ Properties

Chosen for their **biocompatibility**.

Ability to **degrade** into **harmless substances**.

🧪 Examples of Polymers

Poly(L-lactic acid) (PLLA)

Poly(glycolic acid) (PGA)

Poly(lactic acid-co-glycolic acid) (PLGA)

Polycaprolactone (PCL)

Polydioxanone (PDO)

⚙️ Examples of Metals

Primarily **magnesium** and its **alloys**.

🏺 Examples of Ceramics

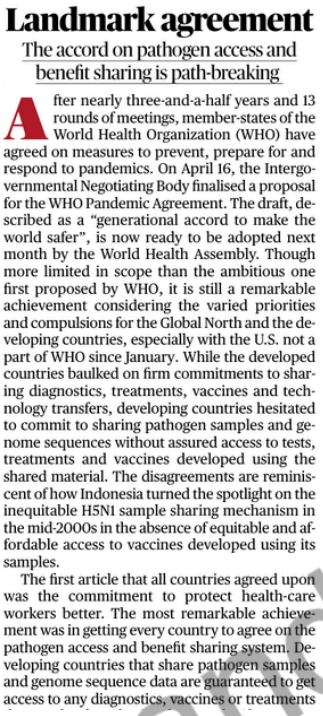
Calcium phosphate is a notable bioresorbable ceramic.

🔄 Purpose

Designed to **eliminate the need for a second surgery**.

Enhances **patient recovery** and **comfort**.

A New Era in Global Health: The WHO Pandemic Agreement and Its Implications



Landmark agreement

The accord on pathogen access and benefit sharing is path-breaking

After nearly three-and-a-half years and 13 rounds of meetings, member-states of the World Health Organization (WHO) have agreed on measures to prevent, prepare for and respond to pandemics. On April 16, the Intergovernmental Negotiating Body finalised a proposal for the WHO Pandemic Agreement. The draft, described as a "generational accord to make the world safer", is now ready to be adopted next month by the World Health Assembly. Though more limited in scope than the ambitious one first proposed by WHO, it is still a remarkable achievement considering the varied priorities and compulsions for the Global North and the developing countries, especially with the U.S. not a part of WHO since January. While the developed countries baulked on firm commitments to sharing diagnostics, treatments, vaccines and technology transfers, developing countries hesitated to commit to sharing pathogen samples and genome sequences without assured access to tests, treatments and vaccines developed using the shared material. The disagreements are reminiscent of how Indonesia turned the spotlight on the inequitable H5N1 sample sharing mechanism in the mid-2000s in the absence of equitable and affordable access to vaccines developed using its samples.

The first article that all countries agreed upon was the commitment to protect health-care workers better. The most remarkable achievement was in getting every country to agree on the pathogen access and benefit sharing system. Developing countries that share pathogen samples and genome sequence data are guaranteed to get access to any diagnostics, vaccines or treatments

Introduction

The global health landscape is undergoing a transformative shift with the introduction of the WHO Pandemic Agreement. This landmark accord is poised to redefine how nations collaborate during health crises, ensuring preparedness and equitable responses. This agreement emphasizes the urgency of collective action in the face of pandemics, drawing critical lessons from the COVID-19 experience.

Background

The Need for a Pandemic Agreement

Historical Context: The world has faced numerous pandemics, yet responses have often been fragmented. The need for a cohesive

agreement stems from the lessons learned during previous health crises.

COVID-19 Insights: The pandemic exposed significant gaps in global health infrastructure, highlighting the necessity for a robust framework.

The Role of the WHO

Mission Overview: The World Health Organization (WHO) has long been at the forefront of global health, advocating for coordinated responses.

Previous Frameworks: Past efforts to prepare for pandemics have laid the groundwork for this new agreement, showcasing the importance of continual evolution in health governance.

The Negotiation Process

Timeline of Negotiations

Key Milestones: The negotiation process has been marked by 13 rounds of meetings, each contributing to the agreement's evolution and refinement.

Stakeholder Involvement: Various stakeholders, including member states, NGOs, and pharmaceutical companies, have played pivotal roles in shaping the agreement.

Impact of U.S. Withdrawal

Negotiation Dynamics: The U.S. withdrawal from WHO raised concerns about the influence of major powers on global health policies and negotiations.

Key Provisions of the WHO Pandemic Agreement

Commitment to Protect Health-Care Workers

Safeguarding Health Workers: A core component of the agreement is the commitment to protect healthcare workers, recognizing their critical role during pandemics.

Pathogen Access and Benefit Sharing System

Explanation: This system ensures that developing countries sharing pathogen samples receive equitable benefits, fostering global collaboration.

Technology Transfer Agreements

Overview: The agreement outlines provisions for technology transfer, crucial for enhancing local vaccine production capabilities.

Conditions: The differentiation between "mutually agreed terms" and "voluntary" conditions reflects the complexities of global negotiations.

Vaccine and Treatment Distribution Commitments

Equitable Distribution: Pharmaceutical companies are tasked with ensuring that vaccines and treatments are distributed equitably, addressing disparities in access.

Challenges and Controversies

Diverging Interests of Developed and Developing Countries

Analysis: Developed nations often prioritize speed and profit, while developing countries focus on access and equity, leading to potential conflicts.

The Role of Pharmaceutical Companies

Influence on Negotiations: The pharmaceutical industry's interests can complicate negotiations, raising ethical questions about prioritizing profit over public health.

Ongoing Negotiations and Future Challenges

Areas of Concern: Negotiations are still ongoing, with potential roadblocks related to implementation and compliance.

Global Implications of the Agreement

Strengthening Global Health Security

Enhancing Security: The agreement aims to bolster global health security, ensuring that nations are better prepared for future pandemics.

Promoting Equity in Health Care

Significance of Equity: Ensuring equitable access to vaccines and treatments is paramount for long-term global health benefits.

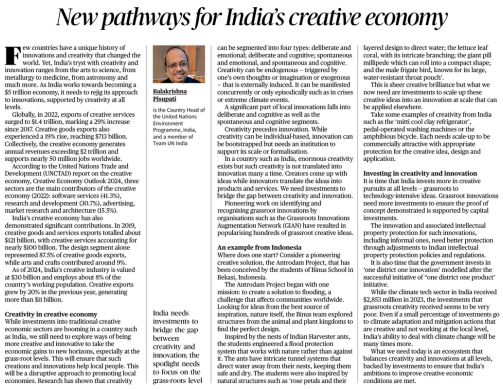
The Future of International Health Governance

Implications: This agreement sets a precedent for future international health governance, reinforcing the role of WHO in global health.

Conclusion

The WHO Pandemic Agreement marks a significant milestone in global health governance, highlighting the importance of collaboration and commitment to equitable health responses. As the world navigates the complexities of health crises, this framework offers hope for a more resilient future.

Landscape of India's Creative Economy



New pathways for India's creative economy

Few countries have a unique history of innovations and creativity that changed the world. Yet, India's tryst with creativity and innovation ranges from the arts to science, from metallurgy to medicine, from astronomy and much more. As India works towards becoming a $5 trillion economy, it needs to rejig its approach to innovations, supported by creativity at all levels.

Globally, in 2022, exports of creative services surged to $1.4 trillion, marking a 29% increase since 2017. Creative goods exports also experienced a 19% rise, reaching $713 billion. Collectively, the creative economy generates annual revenues exceeding $2 trillion and supports nearly 50 million jobs worldwide.

According to the United Nations Trade and Development (UNCTAD) report on the creative economy, Creative Economy Outlook 2024, three sectors are the main contributors of the creative economy (2022): software services (41.3%), research and development (30.7%), advertising, market research and architecture (15.5%).

India's creative economy has also demonstrated significant contributions. In 2019, creative goods and services exports totalled about $121 billion, with creative services accounting for nearly $100 billion. The design segment alone represented 87.5% of creative goods exports, while arts and crafts contributed around 9%.

As of 2024, India's creative industry is valued at $30 billion and employs about 8% of the country's working population. Creative exports grew by 20% in the previous year, generating more than $11 billion.

Creativity in creative economy

While investments into traditional creative economic sectors are booming in a country such as India, we still need to explore ways of being more creative and innovative to take the economic gains to new horizons, especially at the grass-root levels. This will ensure that such creations and innovations help local people. This will be a disruptive approach to promoting local economies. Research has shown that creativity can be segmented into four types: deliberate and emotional, deliberate and cognitive, spontaneous and emotional, and spontaneous and cognitive. Creativity can be endogenous – triggered by one's own thoughts or imagination or exogenous – that is externally induced. It can be manifested concurrently or only episodically such as in crises or extreme climate events.

A significant part of local innovations falls into deliberate and cognitive as well as the spontaneous and cognitive segments.

Creativity precedes innovation. While creativity can be individual-based, innovation can be bootstrapped but needs an institution to support its scale or formalisation.

In a country such as India, enormous creativity exists but such creativity is not translated into innovation many a time. Creators come up with ideas while innovators translate the ideas into products and services. We need investments to bridge the gap between creativity and innovation.

Pioneering work on identifying and recognising grassroot innovations by organisations such as the Grassroots Innovations Augmentation Network (GIAN) have resulted in popularising hundreds of grassroot creative ideas.

An example from Indonesia

Where does one start? Consider a pioneering creative solution, the Antrodam Project, that has been conceived by the students of Binus School in Bekasi, Indonesia.

The Antrodam Project began with one mission: to create a solution to flooding, a challenge that affects communities worldwide. Looking for ideas from the best source of inspiration, nature itself, the Binus team explored structures from the animal and plant kingdoms to find the perfect design.

Inspired by the nests of Indian Harvester ants, the students engineered a flood protection system that works with nature rather than against it. The ants have intricate tunnel systems that direct water away from their nests, keeping them safe and dry. The students were also inspired by natural structures such as 'rose petals and their layered design to direct water; the lettuce leaf coral, with its intricate branching; the giant pill millipede which can roll into a compact shape; and the male frigate bird, known for its large, water-resistant throat pouch'.

This is sheer creative brilliance but what we now need are investments to scale up these creative ideas into an innovation at scale that can be applied elsewhere.

Take some examples of creativity from India such as the 'mitti cool clay refrigerator', pedal-operated washing machines or the amphibious bicycle. Each needs scale-up to be commercially attractive with appropriate protection for the creative idea, design and application.

Investing in creativity and innovation

It is time that India invests more in creative pursuits at all levels – grassroots to technology-intensive ideas. Grassroot innovations need more investments to ensure the proof of concept demonstrated is supported by capital investments.

The innovation and associated intellectual property protection for such innovations, including informal ones, need better protection through adjustments to Indian intellectual property protection policies and regulations.

It is also time that the government invests in 'one district one innovation' modelled after the successful initiative of "one district one product' initiative.

While the climate tech sector in India received $2,853 million in 2023, the investments that grassroots creativity received seems to be very poor. Even if a small percentage of investments go to climate adaptation and mitigation actions that are creative and not working at the local level, India's ability to deal with climate change will be many times more.

What we need today is an ecosystem that balances creativity and innovations at all levels, backed by investments to ensure that India's ambitions to improve creative economic conditions are met.

Balakrishna Pisupati
is the Country Head of the United Nations Environment Programme, India, and a member of Team UN India

India needs investments to bridge the gap between creativity and innovation; the spotlight needs to focus on the grass-roots level

In recent years, India's creative economy has emerged as a significant player on the global stage. With a valuation of approximately **$30 billion**, it employs around **8%** of the country's workforce. As of **2024**, creative exports alone surged by **20%**, generating over **$11 billion**. This sector is not just about artistic expression; it encompasses diverse industries, including software services, research, and advertising, contributing substantially to the economy.

Key Contributors to the Creative Economy

Software Services: Dominating the landscape, accounting for **41.3%** of the creative economy.

Research & Development: Significant contributor with **30.7%** of the economic output.

Advertising, Market Research & Architecture: Representing **15.5%** of the sector.

Global Trends in Creativity

Globally, the creative economy has shown remarkable growth, with **exports of creative services** reaching **$1.4 trillion** in **2022**, a staggering **29%** increase since **2017**. This underscores the increasing importance of creativity in driving economic growth and job creation

Creativity as a Driver of Innovation

Creativity manifests in various forms, often classified into four segments: **deliberate and emotional**, **deliberate and cognitive**, **spontaneous and emotional**, and **spontaneous and cognitive**. Each segment plays a crucial role in fostering innovation, especially at grassroots levels.

Deliberate and Cognitive: Focused creativity that can lead to systematic innovations.

Spontaneous and Cognitive: Ideas that emerge in response to crises or challenges.

Case Study: Grassroots Innovations

Organizations like the **Grassroots Innovations Augmentation Network (GIAN)** have been pivotal in recognizing and nurturing grassroots innovations. For instance, creative solutions like the **mitti cool clay refrigerator** and **pedal-operated washing machines** showcase indigenous ingenuity but require scaling for broader impact.

Investing in the Future of Creativity

To harness the potential of the creative economy, India must increase investments across all levels. The government should consider initiatives like **"one district one innovation"**, which would mirror successful models and stimulate local creativity.

Intellectual Property Protection: Enhancing protections for grassroots innovations is vital. Adjusting policies can safeguard creative ideas and facilitate their transition to market-ready products.

The creative economy is not just a segment of India's growth; it’s a cornerstone. By fostering an ecosystem that combines creativity with innovation, India can navigate its path toward a robust and sustainable economic future.

Bridging the Gap: From Creativity to Innovation

While India is rich in creativity, translating that into scalable innovations remains a challenge. The dichotomy between creators and innovators must be addressed.

Creators vs. Innovators: Creators generate ideas; innovators transform these ideas into tangible products and services.

Investment Needs: To bridge this gap, substantial investments are essential. Financial backing can facilitate the transformation of creative ideas into commercially viable innovations.

Examples of Indian Innovations

Mitti Cool Clay Refrigerator: An eco-friendly solution for food preservation.

Pedal-Operated Washing Machines: A sustainable approach to laundry, particularly in rural areas.

Amphibious Bicycle: A unique transportation solution adaptable to various terrains.

The Role of Government and Policy

Government intervention is critical in nurturing the creative economy. Strategic initiatives can catalyze growth and innovation at grassroots levels.

Investment in Grassroots Innovations: A focus on funding and supporting local creators can yield transformative results.

Intellectual Property Reforms: Strengthening intellectual property laws can protect innovative ideas, encouraging more individuals to contribute creatively.

Key Strategies for Success

Investment in Education and Training: Empowering the workforce with skills needed for the evolving creative economy.

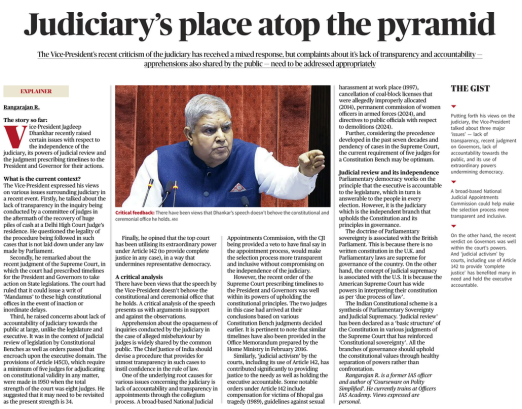
Public-Private Partnerships: Collaborating with businesses can enhance funding opportunities for innovative projects.

Global Collaborations: Engaging with international creative communities can provide fresh perspectives and insights.

Conclusion to the Journey

The journey towards a robust creative economy in India is complex but achievable. By emphasizing creativity and fostering innovation through strategic investments, policy reforms, and nurturing grassroots initiatives, India can position itself as a leader in the global creative landscape.

A Critical Analysis of the Vice-President's Speech and Judicial Accountability in India



Judiciary's place atop the pyramid

The Vice-President's recent criticism of the judiciary has received a mixed response, but complaints about it's lack of transparency and accountability – apprehensions also shared by the public – need to be addressed appropriately

EXPLAINER

Rangarajan R.

The story so far:

Vice President Jagdeep Dhankhar recently raised certain issues with respect to the independence of the judiciary, its powers of judicial review and the judgment prescribing timelines to the President and Governor for their actions.

What is the current context?

The Vice-President expressed his views on various issues surrounding judiciary in a recent event. Firstly, he talked about the lack of transparency in the inquiry being conducted by a committee of judges in the aftermath of the recovery of huge piles of cash at a Delhi High Court Judge's residence. He questioned the legality of the procedure being followed in such cases that is not laid down under any law made by Parliament.

Secondly, he remarked about the recent judgment of the Supreme Court, in April 2025, that prescribed timelines for the President and Governors to take action on State legislations. The court had ruled that it could issue a writ of 'Mandamus' to these high constitutional offices in the event of inaction or inordinate delays.

Third, he raised concerns about lack of accountability of judiciary towards the public at large, unlike the legislature and executive. It was in the context of judicial review of legislation by Constitutional Benches as well as orders passed that encroach upon the executive domain. The provisions of Article 145(3), which require a minimum of five judges to sit for hearing on constitutional validity in any matter, were made in 1950 when the total strength of the court was eight judges. He suggested that it may need to be revisited as the present strength is 34.

Critical feedback: There have been views that Dhankar's speech doesn't behove the constitutional and ceremonial office he holds. AFP

Finally, he opined that the top court has been utilising its extraordinary power under Article 142 (to provide complete justice in any case), in a way that undermines representative democracy.

A critical analysis

There have been views that the speech by the Vice-President doesn't behove the constitutional and ceremonial office that he holds. A critical analysis of the speech presents us with arguments in support and against the observations.

Apprehension about the opaqueness of inquiries conducted by the judiciary in the case of alleged misbehaviour by Judges is widely shared by the common public. The Chief Justice of India should devise a procedure that provides for utmost transparency in such cases to restore public faith in judiciary.

One of the underlying root causes for various issues concerning the judiciary is lack of accountability and transparency in appointments through the collegium process. A broad-based National Judicial Appointments Commission, with the CJI being provided a veto to have final-say in the appointment process, would make the selection process more transparent and inclusive without compromising on the independence of judiciary.

However, the recent order of the Supreme Court prescribing timelines to the President and Governors was well within its powers of upholding the constitutional principles. The two judges in this case had arrived at their conclusions based on various Constitution Bench judgments decided earlier. It is pertinent to note that similar timelines have also been provided in the Office Memorandum prepared by the Home Ministry in February 2016.

Similarly, 'judicial activism' by the courts, including its use of Article 142, has helped in bringing in social justice and justice to the needy as well as holding the executive accountable. Some notable orders under Article 142 include compensation for victims of Bhopal gas tragedy (1989), guidelines against sexual harassment at work place (1997), cancellation of coal-block licenses that were allegedly improperly allocated (2014), permanent commission of women officers in armed forces (2024), and directives to public officials with respect to demolitions (2024).

Further, considering the precedence developed in the past seven decades and pendency of cases in the Supreme Court, the current requirement of five judges for a Constitution Bench may be optimum.

Judicial review and its independence

Parliamentary democracy works on the principle that the executive is accountable to the legislature, which in turn is answerable to the people in every election. However, it is the judiciary which is the independent branch that upholds the Constitution and its principles in governance.

The doctrine of Parliamentary sovereignty is associated with the British Parliament. This is because there is no written constitution in the U.K. and Parliamentary laws are supreme for governance of the country. On the other hand, the doctrine of Judicial Supremacy is associated with the U.S. It is because the American Supreme Court has wide powers in interpreting their constitution as per 'due process of law'.

The Indian Constitutional scheme is a synthesis of Parliamentary Sovereignty and Judicial Supremacy. 'Judicial review' has been declared as a 'basic structure' of the Constitution in various judgments of the Supreme Court that has reinforced 'Constitutional sovereignty'. All the branches of governance should uphold the constitutional values through healthy separation of powers rather than encroachment.

Rangarajan R. is a former IAS officer and author of 'Courtwarm on Polity Simplified'. He currently trains at Officers IAS Academy. Views expressed are personal.

THE GIST

Putting forth his views on the judiciary, the Vice-President talked about three major 'issues' — lack of transparency, recent judgment on Governors, lack of accountability towards the public, and its use of extraordinary powers undermining democracy.

A broad-based National Judicial Appointments Commission could help make the selection process more transparent and inclusive.

On the other hand, the recent verdict on Governors was well within the court's powers. And 'judicial activism' by courts, including use of Article 142 to provide 'complete justice' has benefited many in need and held the executive accountable.

Critique of the Vice-President's Speech

The recent address by the Vice-President has stirred considerable debate regarding its appropriateness for his esteemed position. Critics argue that certain assertions within the speech do not align with the constitutional and ceremonial nature of his office.

Arguments Supporting the Speech:

Advocates claim that the Vice-President's remarks aim to shed light on pressing judicial issues.

They argue that engaging in discourse regarding accountability can foster public trust in the judiciary.

Counterarguments:

Detractors assert that the speech undermines the dignity of the Vice-President's role, straying into controversial territory.

Concerns have been raised about the potential for politicization of the judiciary, which may lead to erosion of its independence.

Transparency in Judicial Inquiries

Public apprehensions regarding the opacity of judicial inquiries into alleged misconduct by judges have become increasingly vocal.

Need for Transparency:

The Chief Justice of India must establish a transparent framework for handling such inquiries.

Transparency will serve to bolster public confidence in the rule of law.

Proposed Solutions:

Implementation of clear procedures for inquiries could mitigate public skepticism.

Regular updates on investigations may help in reassuring citizens about the integrity of the judicial process.

Accountability in Judicial Appointments

A significant underlying issue within the judiciary is the lack of accountability and transparency in the collegium system of appointments.

National Judicial Appointments Commission:

A broad-based commission could enhance the selection process, ensuring inclusivity while maintaining judicial independence.

Granting the Chief Justice a veto power in appointments could strike a balance between accountability and autonomy.

The Role of Judicial Activism

Judicial activism has emerged as a vital mechanism for delivering justice and ensuring executive accountability.

Notable Contributions:

Major rulings under Article 142 demonstrate the judiciary's proactive stance in addressing injustices, such as:

Compensation for victims of the Bhopal gas tragedy (1989).

Guidelines against workplace sexual harassment (1997).

Directives for the permanent commission of women officers in the armed forces (2024).

Current Context:

The Supreme Court's recent orders establishing timelines for the President and Governors exemplify the judiciary's commitment to upholding constitutional principles.

The Nature of Judicial Review

In the context of India’s parliamentary democracy, the judiciary stands as a bastion of constitutional integrity, ensuring that all branches of government adhere to the rule of law.

Synthesis of Sovereignty:

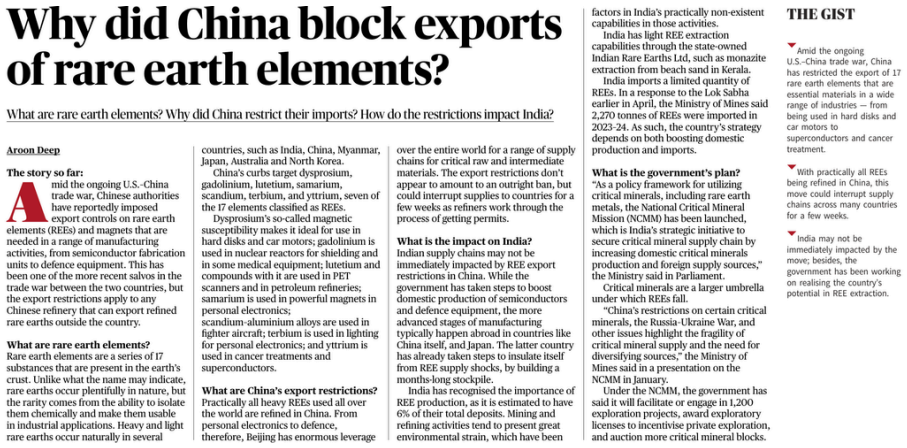
The Indian constitutional framework amalgamates elements of Parliamentary Sovereignty and Judicial Supremacy.

Judicial review has been enshrined as a fundamental aspect of the Constitution, reinforcing the concept of constitutional sovereignty.

Separation of Powers:

It is imperative for governance branches to maintain a healthy separation, preventing any single branch from overpowering another.

Navigating the U.S.–China Trade War and Its Impact on Rare Earth Elements



Why did China block exports of rare earth elements?

What are rare earth elements? Why did China restrict their imports? How do the restrictions impact India?

Aroon Deep

The story so far:

Amid the ongoing U.S.-China trade war, Chinese authorities have reportedly imposed export controls on rare earth elements (REEs) and magnets that are needed in a range of manufacturing activities, from semiconductor fabrication units to defence equipment. This has been one of the more recent salvos in the trade war between the two countries, but the export restrictions apply to any Chinese refinery that can export refined rare earths outside the country.

What are rare earth elements?

Rare earth elements are a series of 17 substances that are present in the earth's crust. Unlike what the name may indicate, rare earths occur plentifully in nature, but the rarity comes from the ability to isolate them chemically and make them usable in industrial applications. Heavy and light rare earths occur naturally in several countries, such as India, China, Myanmar, Japan, Australia and North Korea.

China's curbs target dysprosium, gadolinium, lutetium, samarium, scandium, terbium, and yttrium, seven of the 17 elements classified as REEs.

Dysprosium's so-called magnetic susceptibility makes it ideal for use in hard disks and car motors; gadolinium is used in nuclear reactors for shielding and in some medical equipment; lutetium and compounds with it are used in PET scanners and in petroleum refineries; samarium is used in powerful magnets in personal electronics; scandium-aluminium alloys are used in fighter aircraft; terbium is used in lighting for personal electronics; and yttrium is used in cancer treatments and superconductors.

What are China's export restrictions?

Practically all heavy REEs used all over the world are refined in China. From personal electronics to defence, therefore, Beijing has enormous leverage over the entire world for a range of supply chains for critical raw and intermediate materials. The export restrictions don't appear to amount to an outright ban, but could interrupt supplies to countries for a few weeks as refiners work through the process of getting permits.

What is the impact on India?

Indian supply chains may not be immediately impacted by REE export restrictions in China. While the government has taken steps to boost domestic production of semiconductors and defence equipment, the more advanced stages of manufacturing typically happen abroad in countries like China itself, and Japan. The latter country has already taken steps to insulate itself from REE supply shocks, by building a months-long stockpile.

India has recognised the importance of REE production, as it is estimated to have 6% of their total deposits. Mining and refining activities tend to present great environmental strain, which have been factors in India's practically non-existent capabilities in those activities.

India has light REE extraction capabilities through the state-owned Indian Rare Earths Ltd, such as monazite extraction from beach sand in Kerala.

India imports a limited quantity of REEs. In a response to the Lok Sabha earlier in April, the Ministry of Mines said 2,270 tonnes of REEs were imported in 2023-24. As such, the country's strategy depends on both boosting domestic production and imports.

What is the government's plan?

"As a policy framework for utilizing critical minerals, including rare earth metals, the National Critical Mineral Mission (NCMM) has been launched, which is India's strategic initiative to secure critical mineral supply chain by increasing domestic critical minerals production and foreign supply sources," the Ministry said in Parliament.

Critical minerals are a larger umbrella under which REEs fall.

"China's restrictions on certain critical minerals, the Russia-Ukraine War, and other issues highlight the fragility of critical mineral supply and the need for diversifying sources," the Ministry of Mines said in a presentation on the NCMM in January.

Under the NCMM, the government has said it will facilitate or engage in 1,200 exploration projects, award exploratory licenses to incentivise private exploration, and auction more critical mineral blocks.

THE GIST

- Amid the ongoing U.S.-China trade war, China has restricted the export of 17 rare earth elements that are essential materials in a wide range of industries — from being used in hard disks and car motors to superconductors and cancer treatment.
- With practically all REEs being refined in China, this move could interrupt supply chains across many countries for a few weeks.
- India may not be immediately impacted by the move; besides, the government has been working on realising the country's potential in REE extraction.

Introduction

The U.S.–China trade war has profoundly altered the dynamics of global trade, particularly concerning rare earth elements (REEs). These vital materials are crucial for various industries, from electronics to renewable energy technologies. With China dominating the REE market, recent developments raise significant questions about the sustainability of supply chains and international relations.

Significance of REEs in Manufacturing:

REEs are essential for producing high-tech devices, electric vehicles, and advanced military systems.

Their unique properties enable advancements in technology and renewable energy solutions.

Understanding Rare Earth Elements

What Are Rare Earth Elements?

Rare earth elements encompass a group of 17 metallic elements essential in modern technology. They are categorized into two groups: light REEs and heavy REEs.

Definition and Classification:

The 17 substances include lanthanides and scandium and yttrium, which are often grouped with them due to similar properties.

The 17 REEs:

Lanthanum (La)

Cerium (Ce)

Praseodymium (Pr)

Neodymium (Nd)

Promethium (Pm)

Samarium (Sm)

Europium (Eu)

Gadolinium (Gd)

Terbium (Tb)

Dysprosium (Dy)

Holmium (Ho)

Erbium (Er)

Thulium (Tm)

Ytterbium (Yb)

Lutetium (Lu)

Scandium (Sc)

Yttrium (Y)

The Nature of Rarity

Despite their name, rare earth elements are not particularly scarce in the Earth's crust. However, the complexity of their extraction and refinement makes them relatively rare in terms of economically viable sources.

Geographic Distribution:

REEs are predominantly found in China, the United States, and Australia, with China accounting for over 60% of global production.

Key Rare Earth Elements and Their Uses

Overview of Heavy and Light REEs

Heavy REEs are generally more valuable due to their unique applications in high-tech industries.

Detailed Uses:

Dysprosium: Used in high-performance magnets.

Gadolinium: Essential in MRI contrast agents.

Lutetium: Employed in PET scans and cancer treatment.

Terbium: Vital for green phosphors in LED displays.

Samarium: Used in magnets and nuclear reactors.

Scandium: Enhances aluminum alloys in aerospace applications.

Yttrium: Key component in superconductors and LEDs.

China's Role in the Global REE Market

Dominance in REE Refinement

China's role in the REE market is unparalleled, controlling a significant portion of the global supply chain.

Statistics on Production:

China produces about 80% of the world's REEs, making it a critical player in the market.

Global Reliance:

The U.S. and other countries rely heavily on Chinese imports for REEs, creating strategic vulnerabilities.

Recent Export Restrictions

In response to geopolitical tensions, China has implemented export controls on REEs, impacting global supply chains.

Details of Export Controls:

Export quotas and tariffs have been imposed, limiting the availability of essential materials to foreign manufacturers.

Implications for Supply Chains:

Industries may face disruptions, leading to increased production costs and delays in technological advancements.

The Impact of Export Controls

Immediate Effects on Global Supply Chains

The export restrictions have immediate ramifications for multiple sectors, particularly those reliant on REEs.

Potential Disruptions:

Manufacturing sectors, including automotive and electronics, may experience shortages.

Case Studies:

The electric vehicle industry is particularly vulnerable, as key components rely on rare earth materials.

Long-term Consequences for Global Trade

The long-term implications of these export controls may reshape international trade dynamics.

Reshaping Trade Dynamics:

Countries may seek to diversify their suppliers, reducing reliance on China.

Increased Tensions:

Heightened trade tensions between the U.S. and China could lead to further restrictions and retaliatory measures.

The Situation in India

Current State of REE Production in India

India is positioning itself as a potential alternative source of REEs.

Overview of Deposits:

India has significant REE deposits, particularly in the eastern states.

Role of Indian Rare Earths Ltd:

This state-owned enterprise plays a crucial role in the extraction and processing of REEs.

Impact of China's Restrictions on India

India's supply chains may be affected by China's export controls.

Assessment of Impact:

Indian industries reliant on REEs may face challenges in sourcing materials.

Comparison with Japan:

Japan has proactively sought alternative suppliers and developed recycling technologies.

Government Initiatives and Strategic Plans

Introduction to the National Critical Mineral Mission (NCMM)

India's government has launched initiatives to secure its REE supply chains.

Goals and Objectives:

The NCMM aims to enhance domestic production and reduce dependence on imports.

Environmental Considerations

The Environmental Impact of REE Mining

The extraction of REEs poses environmental challenges.

Overview of Environmental Challenges:

Mining operations often lead to land degradation and pollution.

India's Approach to Sustainable REE Production

India is exploring sustainable practices in REE extraction.

Government Policies:

Initiatives have been introduced to minimize environmental damage.

Future Prospects for REE Supply Chains

Diversification of Supply Sources

Countries are looking to reduce their dependency on Chinese REEs.

Strategies for Diversification:

Establishing international partnerships and exploring alternative sources.

Technological Innovations in REE Alternatives

Research is underway to develop materials that can substitute REEs.

Breakthroughs in Recycling:

Innovations in recycling technologies hold promise for reducing demand for new REE extraction.

Conclusion

The U.S.–China trade war has far-reaching implications for the rare earth elements market. As countries navigate these challenges, strategic planning and sustainable practices will be essential for securing future supply chains.

India imposes 12% temporary tariff on steel imports

The move to levy the 'safeguard duty' is aimed at restricting unbridled imports, says a government notification; FinMin says tariffs will be applicable for 200 days with effect from Monday

Reuters
NEW DELHI

India imposed a 12% temporary tariff, locally known as a safeguard duty, on some steel products to stem unbridled imports, a government notification said on Monday.

India, the world's second-biggest producer of crude steel, said the tariffs would be applicable for 200 days with effect from Monday. "The safeguard duty imposed under this notification shall be effective for a period of two hundred days (unless revoked, superseded or amended earlier) from the date of publication of this notification," the Ministry of Finance said.

Steely resolve: New Delhi's tariffs are primarily aimed at China, which was the second-biggest exporter of steel to India. REUTERS

India's steel tariff increase is its first big trade policy move since U.S. President Donald Trump imposed a wide range of duties on countries in April.

New Delhi's tariffs are primarily aimed at China, which was the second-biggest exporter of steel to India behind South Korea in 2024/25. India was a net importer of finished steel for the second consecutive year in the 2024/25 fiscal year, with shipments reaching a nine-year high of 9.5 million metric tons, according to provisional government data.

Welcoming the move, T. V. Narendran, CEO & MD, Tata Steel said, "This is a critical step in addressing the surge of unfairly priced imports to India."

(With inputs from Lalatendu Mishra in Mumbai)

What is a safeguard duty?

A safeguard duty is **a type of customs duty imposed by emergency action under the WTO Agreement on Safeguards**. It is designed to prevent harm and injury to a domestic industry that would face intense competitive pressure from the continued importation of a particular good

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Snowfall Decline in the Hindu Kush-Himalayan Region

Two billion people depend on snowmelt from the Hindu Kush-Himalayan range for water. GETTY IMAGES/ISTOCKPHOTO

Low Himalayan snow threatens 2 billion people

Agence France-Presse
ISLAMABAD

Snowfall in Asia's Hindu Kush-Himalayan mountain range has reached a 23-year low, threatening nearly two billion people dependent on snowmelt for water, scientists warned in a report on Monday.

The Hindu Kush-Himalayan range, which stretches from Afghanistan to Myanmar, holds the largest reserves of ice and snow outside the Arctic and Antarctica.

Researchers found "a significant decline in seasonal snow across the Hindu Kush Himalaya region, with snow persistence (the time snow remains on the ground) 23.6 percent below normal – the lowest in 23 years," the International Centre for Integrated Mountain Development (ICIMOD) said.

"This trend, now in its third consecutive year, threatens water security for nearly two billion people," it said in its Snow Update Report.

The study also warned of "potential lower river flows, increased groundwater reliance, and heightened drought risk".

Sher Muhammad, the lead author of the ICIMOD report, told AFP that "this year the snowfall started late in January and remained low in the winter season on average".

Several countries in the region have already issued drought warnings. The inter-governmental ICIMOD organisation is made up of member countries Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan.

It urged countries that rely on the 12 major river basins in the region to develop "improved water management, stronger drought preparedness".

🌨️ **Snowfall in the Hindu Kush-Himalayan mountain range** has reached a 23-year low, affecting water supply for nearly two billion people.

🏔️ This mountain range, extending from Afghanistan to Myanmar, holds the largest ice and snow reserves outside the Arctic and Antarctica.

📉 **Seasonal snow persistence** is reported to be 23.6% below normal, marking the lowest levels in over two decades.

🚨 The decline in snowfall has persisted for three consecutive years, raising concerns about water security.

💧 The report highlights potential consequences such as reduced river flows, increased reliance on groundwater, and a heightened risk of drought.

⏳ Snowfall this year began late in January and remained low throughout the winter season.

🌍 **ICIMOD**, the organization behind the report, includes member countries like Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan, and calls for improved water management strategies.
