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Edition: International Table of Contents

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On May 19, 2025, the Indian Space Research Organisation (ISRO) attempted to launch EOS-09, an earth observation satellite, using the PSLV-C61 vehicle from the Satish Dhawan Space Centre, Sriharikota. The rocket lifted off at 5:59 a.m., but minutes after launch, the mission failed due to a technical glitch in the rocket's third stage. This event marks a rare failure for the PSLV (Polar Satellite Launch Vehicle), which has long been considered a highly reliable launch vehicle for ISRO.

Satellite launch went wrong minutes after lift-off due to glitch: ISRO

Hemanth C.S.
BENGALURU

The Indian Space Research Organisation said it could not complete the mission to put the earth observation satellite EOS-09 into orbit following a technical glitch minutes after the PSLV-C61 rocket lifted off with it from the Satish Dhawan Space Centre in Sriharikota at 5.59 a.m. on Sunday.

ISRO Chairman V. Narayanan told presspersons that there "was a fall in chamber pressure in the motor case" during the third stage, due to which the "mission could not be accomplished".

The PSLV-C61 was expected to place the satellite into a sun synchronous polar orbit 17 minutes after lift-off.

"The PSLV is a four-stage vehicle and second-stage performance was quite normal. The third stage's motor started perfectly, but during the functioning of the stage, we are seeing an observation and the mission could not be accomplished. After analysis, we shall come back," Mr. Narayanan said.

The third stage is a solid rocket motor that provides the upper stages higher thrust after the atmospheric phase of the launch.

Former ISRO Chairman S. Somanath, in a post on X, said, "I am aware of the formidable challenges we faced during the development of the third-stage solid motor – an endeavour marked by multiple failures. It is indeed unusual to witness such anomalies resurfacing at this stage. Nevertheless, I have complete confidence that the team will identify the root cause both swiftly and effectively."

Before Sunday's launch, the PSLV had suffered only two failures. The very first mission in 1993, PSLV-D1, could not place the satellite in orbit and in 2017, the 41st flight ended in failure.

Sunday's setback follows the ISRO's failure to perform an intended orbit-raising operations for the NVS-02 satellite due to a valve malfunction. The NVS-02 was launched on January 29 in what was the landmark 100th launch from Sriharikota.

Failed attempt: The PSLV- C61 lifts off from the Satish Dhawan Space Centre in Sriharikota on Sunday morning. B. JOTHI RAMALINGAM

The C61 mission was also the 63rd flight of the Polar Satellite Launch Vehicle and the 27th in the PSLV-XL configuration.

Since the 2017 failure, all PSLV launches had been successful with the previous one being the SpaDeX mission in December 2024.

Similar to the EOS-04 satellite, EOS-09 was designed with the mission objective of ensuring remote sensing data for the user community engaged in operational applications and to improve the frequency of observation.

The space agency said the spacecraft was configured using ISRO's RISAT-1 heritage bus, with most of the functional requirements of the Synthetic Aperture Radar (SAR) payload and the bus platform systems derived from the earlier ISRO missions.

The satellite weighing 1,696.24 kg carries a SAR payload capable of providing images for various earth observation applications under all-weather conditions.

The EOS-09 was designed to provide continuous and reliable remote sensing data for operational applications across various sectors and had a mission life of five years, the ISRO said.

What Went Wrong:

- According to ISRO Chairman V. Narayanan, the failure occurred due to a fall in chamber pressure in the motor case during the operation of the third stage, which is a solid-fuel rocket motor.
- Although the first and second stages of the PSLV performed normally, the anomaly in the third stage led to mission termination before the satellite could be placed in orbit.
- The PSLV-C61 was supposed to insert EOS-09 into a sun-synchronous polar orbit approximately 17 minutes after lift-off.

About PSLV and Previous Failures:

- The PSLV (Polar Satellite Launch Vehicle) is a four-stage launch vehicle known for launching satellites into sun-synchronous and low Earth orbits. The PSLV-C61 mission was the 63rd PSLV flight and the 27th in its XL configuration.

- Before this, PSLV had only two recorded failures: the first in 1993 (PSLV-D1) and the second in 2017 (PSLV-C39). This means that PSLV has maintained a very high success rate, making this third failure significant from both a technical and historical perspective.

About EOS-09 Satellite:

- EOS-09 (Earth Observation Satellite) was developed to provide remote sensing data for operational applications such as agriculture, forest cover monitoring, and disaster management.
- The satellite was built using ISRO's RISAT-1 heritage bus and was equipped with a Synthetic Aperture Radar (SAR) payload.
- SAR technology allows imaging through clouds and at night, making EOS-09 valuable for all-weather, day-night observation. The satellite weighed around 1,696.24 kg and had a planned mission life of five years.

Recent Setbacks and Concerns:

- This incident follows another recent issue involving the NVS-02 satellite, where a valve malfunction prevented successful orbit-raising operations. NVS-02 was part of the navigation satellite series launched in January 2025, and its failure marked the 100th launch from Sriharikota.
- Two consecutive mission failures raise concerns about system reliability, quality control, and potential delays in data availability for strategic and civilian uses.

Significance for Prelims:

- **Launch Vehicle:** PSLV is a four-stage launch vehicle using alternate solid and liquid propulsion stages.
- **EOS Series:** Earth Observation Satellites like EOS-04 and EOS-09 are used for remote sensing applications.
- **SAR Payload:** Synthetic Aperture Radar allows imaging in all-weather and night-time conditions.
- **Past Failures:** PSLV has had only three failures in its long operational history – 1993, 2017, and now in 2025.
- **Recent Launches:** The previous successful PSLV mission was SpaDeX in December 2024.
- **ISRO Leadership:** The current Chairman is V. Narayanan, and former Chairman S. Somanath has commented on the technical challenges involved in the third-stage motor.

UPSC PrelimsPractice Question

Ques : With reference to the PSLV-C61 mission, consider the following statements:

1. The mission failed due to a malfunction in the liquid-fueled third stage of the PSLV.

2. EOS-09 was to be placed into a Sun-Synchronous Polar Orbit.

3. This was the first time the PSLV experienced a failure since its inception.

Which of the statements given above is/are correct?

a) 1 and 2 only

b) 2 only

c) 1 and 3 only

d) 1, 2 and 3

Ans: b)

Page 03 : GS3 : Environment

The Tamil Nadu government has transferred the management of its Endangered Species Conservation Fund to the Advanced Institute for Wildlife Conservation (AIWC), due to the non-functionality of the previously designated agency.

Background:

- **Fund Launch:** Announced in 2024 with an initial corpus of ₹50 crore.
- **Original Manager:** The State Forest Development Agency (SFDA) was initially designated to manage the fund.
- **Problem:** SFDA was found to be largely defunct and inactive, raising concerns about fund utilization.
- **Interim Arrangement:** The fund was held by state financial corporations—TN Power Finance Corporation or TN Transport Development Finance Corporation.

Recent Development:

- Management Shift: The fund will now be managed by AIWC in Vandalur, a state-recognized wildlife research institute.
- Reason: To avoid delays in fund utilization as forming a new trust would take around six months.
- AIWC: Recently registered as a society, active in wildlife research and conservation.

Key Objectives of the Fund:

- Surveying, assessing, and mapping endangered species across Tamil Nadu.
- Enhancing conservation efforts within and beyond protected areas.
- Building partnerships for long-term conservation.
- Research Promotion: AIWC to invite research proposals, focusing on species like Salim Ali's fruit bat and Malabar civet.

Prelims Pointers:

- AIWC is located in Vandalur, Tamil Nadu.

AIWC to manage T.N. endangered species conservation fund

Geetha Srimathi
CHENNAI

After the Tamil Nadu Forest Department's plan to safeguard endangered wildlife hit a roadblock, it has been decided that the fund would be rerouted through the Advanced Institute of Wildlife Conservation (AIWC).

Announced in 2024 with an initial corpus of ₹50 crore, the Tamil Nadu Endangered Species Conservation Fund was initially set to be managed by the State Forest Development Agency (SFDA). However, concerns have emerged after it was found that the SFDA, a body responsible for promoting forestry development, has been largely defunct and inactive for some time.

In a government order issued in November 2024, the SFDA was designated as the managing agency for the fund, which was to be initially overseen by the Mudumalai Tiger Reserve Foundation. The corpus of ₹50 crore was to be held by the Tamil Nadu Power Finance Corporation or the Tamil Nadu Transport Development Finance Corporation until further arrangements were made, according to the Government Order.

However, after scrutiny, Supriya Sahu, Additional Chief Secretary to the Departments of Environment, Climate Change, and Forests, acknowledged that the agency's inability to operate effectively would hinder the fund's intended goals.

Key goals of the fund include surveying, assessing, and mapping threatened species.

She said that upon realising the SFDA's dysfunctional status, there were initial plans to create a new society or trust to manage the fund. However, this process was expected to take at least six months, which would delay the fund's deployment.

To address this, the Forest Department has now decided to transfer the responsibility of managing the fund to the AIWC in Vandalur, an institution known for its research and initiatives in wildlife conservation, which has been recently registered as a society.

The key objectives of the fund include surveying, assessing, and mapping threatened species across the State, enhancing conservation efforts both inside and outside protected areas, and building partnerships for the long-term protection of vulnerable species.

Soon, the AIWC is expected to invite grant proposals for research on endangered species in the State, including Salim Ali's fruit bat and Malabar civet.

- Salim Ali's fruit bat and Malabar civet are critically endangered species found in India.
- The ₹50 crore corpus was meant for species conservation in Tamil Nadu.
- The State Forest Development Agency (SFDA) was the original nodal body but was found inactive.
- **State-Level Wildlife Conservation:** Highlights how state-specific institutions and funds play a role in biodiversity protection.
- **Institutional Mechanism:** Shows how governance challenges (like defunct agencies) can delay conservation.
- **Species Focus:** Emphasizes the importance of lesser-known endangered species.
- **AIWC Role:** As an example of a specialized institute used for conservation implementation.

UPSC Prelims Practice Question

Ques: Which of the following institutions has been recently entrusted with the management of the Tamil Nadu Endangered Species Conservation Fund?

a) Mudumalai Tiger Reserve Foundation

b) State Forest Development Agency (SFDA)

c) Tamil Nadu Biodiversity Board

d) Advanced Institute for Wildlife Conservation (AIWC)

Ans: d)

Page : 07 :GS 3 : Science and Technology

The article explores a little-understood genetic phenomenon called A-to-I mRNA editing, where adenosine (A) is edited into inosine (I) in messenger RNA. Though known to exist in animals and fungi, scientists are still unsure why this complex editing process evolved instead of simpler genetic mechanisms.

- A recent study on Fusarium graminearum, a fungus that affects cereal crops, offers some insight into the developmental timing and necessity of this editing, particularly during the fungus's sexual stage.

Our bodies perform a kind of mRNA editing, and we don't know why

Researchers from China recently reported that it's hard to make sense of the widespread persistence of A-to-I mRNA editing in animals; now a study into a particular fungus appears to show that editing is delayed in certain stages of growth to suit the conditions and begins when it is necessary to promote development in the next stage

D.P. Kasbekar

The noted geneticist and evolutionary biologist Theodosius Dobzhansky (1900-1975) published an essay in 1973 in the journal *American Biology Teacher*, titled 'Nothing in biology makes sense except in the light of evolution.' The title became wildly popular in scientific circles. It was even engraved in the Jordan Hall of Science at the University of Notre Dame in the US.

Recently, an article in the *Journal of Molecular Evolution* by Qiuhua Xie and Yuange Duan from China Agricultural University, Beijing, posited that even in evolution's light, it is not easy to make sense of the widespread persistence of A-to-I RNA editing in animals and fungi.

A-to-I RNA editing had not yet been discovered in Dobzhansky's time.

Cooking a protein

The DNA is basically a book of recipes. Each recipe tells the cells in our bodies how to make specific proteins by combining 20 ingredients, called amino acids, in different ways.

Sometimes a recipe is for a single protein; sometimes it's for multiple. Either way, each recipe is called a gene. The recipes are written in the gene's own language, which uses an alphabet consisting of four 'letters': A, T, G, and C. For example, the ingredient alanine can be written as GCA, glycine can be written as GGT, and so on.

A cell transcribes the recipe to make a protein from a gene in the DNA to an mRNA. Then the cell moves the mRNA from the nucleus to the ribosome, where the mRNA is "read" to make the protein.

Sometimes, after the cell copies a recipe to the mRNA, it switches particular letters in it – specifically, the 'A' in the mRNA language above (standing for adenosine) to 'I' (inosine). This conversion is called A-to-I mRNA editing. Proteins in the cell called ADAR are responsible for it.

And when a ribosome reads from this mRNA to make the protein, it reads inosine as though it was guanine. Thus, A-to-I mRNA editing results in a protein with an amino acid coded by, say, AXX to be manufactured as the protein with the amino acid encoded by GXX instead.

This can be dangerous.

Why so complicated?

Some letters in the recipe tell a ribosome where the recipe ends. They're called stop codons. Two examples are UAG and UGA. When the ADAR proteins act on either of them, the ribosome reads them as UGG instead, which is the instruction to insert the amino acid tryptophan. So instead of stopping at that point, the protein under construction receives tryptophan, and the ribosome continues until it hits the next stop codon.

The funky part is that while we know ADAR-mediated A-to-I mRNA editing exists, we have no idea why.

For example, if the goal was for a cell to instruct a ribosome to see UGG instead of UAG, it would have been simpler for the DNA to say UGG to begin with. But the ADAR-mediated way is for some unknown reason more complicated: the DNA says UAG, followed by the ADAR proteins intervening to change it to UGG later.

The DNA is basically a book of recipes. Each recipe tells the cells in our bodies how to make specific proteins by combining 20 ingredients, called amino acids, in different ways. Representative illustration. GETTY IMAGES/ISTOCKPHOTO

Making sense

In a January 2024 study, researchers from the Northwest A&F University in Yangling, China, posed this question to a fungus called *Fusarium graminearum*, which infects wheat and barley crops.But instead of finding another reminder of the mystery, they found a glimpse of a clue.

When *F. graminearum* grows on an infected plant, i.e. in its vegetative growth stage, its cells don't do any A-to-I mRNA editing. But when the fungus enters its sexual stage, more than 26,000 sites transcribed from its DNA into mRNA undergo A-to-I mRNA editing.

Why?

If the goal was for a cell to instruct a ribosome to see UGG instead of UAG, it would have been simpler to say UGG to begin with. But the ADAR way is for some unknown reason more complicated

The team focused on 71 *F. graminearum* genes whose coding sequence was interrupted by a UAG stop codon that the ADAR proteins had scrambled. Since the pre-scrambled mRNA version of all these genes contained a premature stop codon, the team called the genes *PSC*.

When they deleted any one of the *PSC* genes from the genome, *F. graminearum* wasn't affected in its vegetative growth stage. But when they started deleting *PSC* genes in its sexual stage, there were observable effects.

This proved A-to-I mRNA editing was essential for the proper function of the *PSC* genes during sexual development.

They also found that the unedited version of two genes (*PSC69* and *PSC64*) helped the fungus resist environmental stresses during the vegetative growth stage. This meant that mutating the A to a G in the DNA would be disadvantageous during asexual growth. These findings together explained why evolution didn't replace the A in the DNA sequence of these two genes with a G at the beginning of their lives.

Never so easy

Of the 71 genes the team examined, only two seemed to benefit from A-to-I mRNA editing. But what about the other 26,000 sites in the fungus's genome? It's possible that over time, the genes that benefit from A-to-I mRNA editing will increase and mRNA editing by ADARs will become an essential component of the gene-expression pathway. At that point, it's conceivable that more G-to-A mutations will begin to accumulate in the genome, sheltered by the ADAR-based editing machinery.

King Alfonso X (1221-1284) of Spain reputedly grumbled, "If the Lord Almighty had consulted me before embarking upon his creation, I should have recommended something simpler."

The Beijing researchers seem to have shared this lament but were more prosaic in their articulation. Explaining the net benefit of A-to-I mRNA editing "is far more difficult than revealing its function," they wrote in their paper.

(D.P. Kasbekar is a retired scientist. kasbekardp@yahoo.co.in)

THE GIST

When *F. graminearum* grows on an infected plant in its vegetative growth stage, its cells don't do any mRNA editing. But when the fungus enters its sexual stage, more than 26,000 sites transcribed from its DNA into mRNA undergo A-to-I mRNA editing

Seventy-one *F. graminearum* genes' coding sequences were interrupted by a stop codon, called PSC. When a PSC gene was deleted during vegetative growth, it was not affected, but when the researchers deleted PSC genes in the sexual stage, there were observable effects

It is possible that over time genes that benefit from A-to-I mRNA editing will increase and mRNA editing by ADARs will become essential. At that point, it's conceivable that more G-to-A mutations will begin to accumulate in the genome

What is A-to-I mRNA Editing?

- **It's a post-transcriptional modification:** after mRNA is created from DNA, certain adenosines (A) are converted to inosines (I).
- Inosine is read as guanine (G) by the ribosome, resulting in a change in the amino acid being translated into the protein.
- This editing is done by ADAR proteins (Adenosine Deaminases Acting on RNA).

Why is it Puzzling?

- The same result (e.g., a G instead of A) could have been achieved directly at the DNA level.
- The editing is delayed and conditional, making it more complex than needed—raising evolutionary and functional questions.
- Some edits alter stop codons, making proteins longer than originally coded.

Key Findings from the Study on F. graminearum:

- In the vegetative (asexual) stage, no A-to-I editing happens.
- In the sexual stage, over 26,000 sites undergo editing.
- 71 genes with premature stop codons were studied (PSC genes).
- Editing is essential for proper development during the sexual phase.
- Two PSC genes (PSC69 and PSC64) were found to aid stress resistance in the unedited state during vegetative growth.
- Mutating A to G in the DNA would have been harmful in earlier stages, hence editing serves a developmental regulatory role.

Implications:

- Understand post-transcriptional gene regulation like RNA editing.
- Know the function of ADAR enzymes and their role in protein synthesis.
- Be aware of terms like stop codons, premature stop codons, and protein coding sequences.
- Recognize the role of epigenetic mechanisms and non-DNA-based regulation in gene expression.

Conclusion:

- While A-to-I mRNA editing remains a biological mystery, studies like the one on F. graminearum provide glimpses into how evolution might have preserved such a mechanism for stage-specific advantages. This opens new dimensions in evolutionary genetics, biotechnology, and gene regulation, all of which are crucial domains for UPSC aspirants in both science-based Prelims questions and analytical Mains answers.

UPSC MainsPractice Question

Ques: Post-transcriptional modifications like A-to-I mRNA editing challenge the central dogma of molecular biology. Discuss with reference to recent scientific findings. (15 marks)

Page 10 : GS 2 : Indian Polity

President Droupadi Murmu has invoked Article 143 of the Indian Constitution to seek the Supreme Court's opinion on legal questions arising from a recent judgment that fixed timelines for gubernatorial and presidential assent to state bills and made such decisions judicially reviewable.

What is a Presidential reference?

What does Article 143 of the Constitution state? Do other nations also have provisions wherein the government can raise legal questions with their respective judiciaries? What has President Droupadi Murmu raised with the Supreme Court? Should the top court answer these questions compulsorily?

EXPLAINER

Rangarajan. R

The story so far:
President Droupadi Murmu, has made a reference to the Supreme Court, under Article 143 of the Constitution, on certain questions of law and has sought its opinion on those questions.

What is the historical context?
The advisory jurisdiction of the Supreme Court under Article 143 is a relic of the Government of India Act, 1935. It vested the Governor-General with discretionary power to refer any question of law of public importance to the federal court for its opinion.

A similar provision is available in the Canadian constitution. This mechanism allows the Supreme Court of Canada to offer opinions on legal questions referred to it by the federal or provincial governments. The U.S. Supreme Court on the other hand has consistently declined to provide any advisory opinion to the executive as it would violate the strict separation of powers envisaged in its constitution.

What are the provisions?
As per Article 143, the President may refer any question of law or fact of public importance to the Supreme Court for its opinion. The President makes such a reference based on the advice of the Union council of ministers. Article 145 of the Constitution provides that any such reference shall be heard by a bench of minimum five judges.

The Supreme Court may provide its opinion after such hearing as it thinks fit. The opinion is legally not binding on the President, and does not hold a precedential value for the courts to follow in subsequent cases.

However, it carries a strong persuasive value and is usually followed by the executive and the courts.

Pointed questions: President Droupadi Murmu during the swearing-in ceremony of Justice Bhushan Ramkrishna Gavai at the Rashtrapati Bhavan in New Delhi, on May 14. PTI

What were past instances?
There have been around fifteen references made since 1950 before the current reference. Some of the landmark opinions from such references is summarised here.

The first reference was made in the Delhi Laws Act case (1951) which laid down the contours of 'delegated legislation', through which the legislature could delegate legislative powers to the executive for effective implementation of any law. The reference in the Kerala Education Bill (1958) resulted in the court laying down the principle of harmonious construction between Fundamental Rights and Directive Principles of State Policy as well as interpretation of protection given to minority educational institutions under Article 30. In the Berubari case (1960), the court opined that ceding or acquisition of territory by India would need a constitutional amendment under Article 368. In the Keshav Singh case (1965), the court interpreted the powers and privileges of the legislature. In the Presidential poll case (1974), the court opined that Presidential elections should be held notwithstanding vacancies in the electoral college due to dissolution of State assemblies.

The opinion provided in the Special Courts Bill (1978) was significant on many counts. It provided that the court may decline to answer a reference; that the questions referred must be specific and not vague; and that the court, while answering a reference, should not encroach upon the functions and privileges of Parliament. The Third Judges case reference (1998) laid down detailed guidelines for the collegium system with respect to the appointment of judges to the higher judiciary.

It is not obligatory for the Supreme Court to render its opinion. However, out of the references made till date, the court has declined to provide its opinion for only one reference in 1993 with respect to the Ram Janmabhoomi case.

What is the current reference?
The current reference is a result of a recent Supreme Court judgment that had specified timelines for Governors and the President to act on Bills passed by State legislatures. The court had also held that decisions by Governors and the President on such Bills are subject to judicial review. The present reference has raised 14 questions, primarily surrounding the interpretation of Articles 200 and 201, for the court's opinion. The government has raised questions regarding the authority of the courts to prescribe timelines when they are not specified in the Constitution. It has questioned whether the actions of Governors and the President can be made justiciable at a stage prior to the enactment of a Bill into a law. The reference also seeks opinion on the extent of powers that can be exercised by the Supreme Court under Article 142.

Political differences between the Union government and Opposition-ruled State governments have been the principal reason for this conflict. The Supreme Court had adopted the timelines prescribed for the President in the Office Memorandum of the Home Ministry while passing its judgment. In the Cauvery dispute reference (1992), the court had opined that it cannot sit on appeal over prior judgments in its advisory capacity. However, an authoritative opinion on this reference will hopefully settle the issues surrounding these constitutional provisions that are crucial for the smooth functioning of our democracy and federalism.

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

THE GIST

- The advisory jurisdiction of the Supreme Court under Article 143 is a relic of the Government of India Act, 1935.
- The current reference is a result of a recent Supreme Court judgment that had specified timelines for Governors and the President to act on Bills passed by State legislatures.
- There have been around fifteen references made since 1950 before the current reference.

What is a Presidential Reference?

- Under Article 143, the President of India can refer to the Supreme Court any question of law or fact of public importance, seeking its advisory opinion.
- Such a reference is made on the advice of the Council of Ministers, and the Supreme Court's opinion is not binding—but carries significant persuasive authority.

Historical Background:

- This provision is derived from the Government of India Act, 1935, which empowered the Governor-General to refer legal questions to the Federal Court.
- Similar practices exist in countries like Canada, where the judiciary may provide advisory opinions to the government.
- In contrast, the United States strictly prohibits such advisory opinions to preserve separation of powers.

Significance of Advisory Jurisdiction:

- While not binding, Presidential references serve to:
  - Clarify constitutional ambiguities
  - Ensure institutional coordination between the executive and judiciary
  - Provide a legal foundation for action on sensitive or grey areas of law

Notable Past References:

- Some landmark Presidential references include:
  - **Delhi Laws Act case (1951):** Clarified the scope of delegated legislation.
  - **Kerala Education Bill (1958):** Balanced Fundamental Rights vs. Directive Principles.
  - **Berubari Case (1960):** Clarified that territorial cession requires constitutional amendment.
  - **Keshav Singh Case (1965):** Addressed legislative privileges and judicial oversight.
  - **Third Judges Case (1998):** Defined the collegium system for judicial appointments.
- Importantly, the Ram Janmabhoomi reference (1993) was the only instance where the Supreme Court declined to provide an opinion, citing lack of specificity and political overtones.

What is the Current Reference About?

- Triggered by a recent SC ruling on timelines for presidential and gubernatorial assent to state bills, the government has raised 14 legal questions, notably:
  - Can the court prescribe timelines not mentioned in the Constitution?
  - Are executive decisions (e.g., assent to bills) justiciable before a law is enacted?
  - What is the extent of judicial power under Article 142?
- This reference comes amid centre-state tensions, especially between the Union and opposition-ruled states.

Constitutional and Federal Implications:

- Raises questions about the limits of judicial review over executive discretion.
- Highlights tensions in Indian federalism, particularly regarding gubernatorial powers.
- Reopens debate over constitutional silences, such as undefined timeframes for assent to bills.

Analytical Relevance for Mains:

- Tests understanding of the separation of powers and judicial restraint.
- Provides a platform to discuss the relationship between the judiciary and the executive.
- Encourages analysis of Article 143's utility in resolving institutional deadlocks.
- Challenges aspirants to consider constitutional conventions vs. textual interpretation.

Conclusion:

- The current reference under Article 143 is not merely a legal query but a constitutional moment—one that may clarify institutional boundaries, reinforce democratic conventions, and shape the future of Indian federalism. How the Supreme Court chooses to respond (or whether it responds at all) will have significant ramifications for executive accountability, legislative autonomy, and judicial credibility.

UPSC MainsPractice Question

Ques : What is a Presidential Reference under Article 143 of the Indian Constitution? Discuss its significance in maintaining constitutional harmony between organs of government.(250 words)

Page 11: GS 3 : Science & Technology

Artificial Intelligence (AI) is not just automating tasks but restructuring Indian workplaces, shifting them from traditional pyramid-style hierarchies to a potential hourglass model — where top leaders strategize, AI handles the middle layer, and frontline workers collaborate with intelligent tools.

- This transformation promises efficiency, innovation, and flexibility, but also brings deep structural, social, and ethical challenges.

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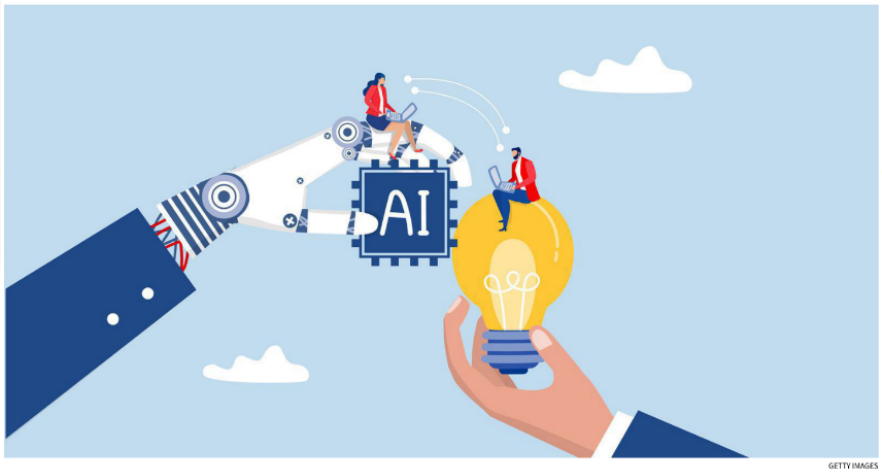

GETTY IMAGES

From pyramids to hourglasses: how AI can change Indian workplaces

McKinsey estimates that Artificial Intelligence could pump trillions into the global economy, with firms seeing productivity rise by up to 25% when they embrace it. That's the lure that AI promises — efficiency and flexibility

Venkat Ram Reddy Ganuthula
Krishna Kumar Balaraman

Artificial Intelligence (AI) has outgrown its role as a mere task automator – it's now reshaping how Indian companies are built and run. The old pyramid model, with its top tier of bosses, a thick layer of middle managers, and broad base of workers, is giving way to something new – an hourglass. In this setup, AI shrinks the middle by taking over coordination and decision-making, letting leaders at the top focus on strategy while the bottom diversifies into a mix of people and smart tools.

For India, this shift is a double-edged sword, brimming with potential yet fraught with hurdles. Getting it right could propel Indian businesses onto the global stage while getting it wrong could leave them trailing.

The hourglass model

Imagine a company where top executives plan for the future without worrying about the nitty-gritties of the everyday workspace because AI now handles schedules, tracks performance, and crunches data for decisions. The middle level, once crowded with managers, thins out as AI steps in, cutting the need for human oversight. At the base, frontline workers, specialists, and AI systems team up using real-time insights to get the job done more efficiently. It's a sleeker and quicker way to work, and is powered by AI's ability to sync operations, adapt on the fly, and pair human ingenuity with machine precision. McKinsey estimates that AI could pump trillions into the global economy, with firms seeing productivity rise by up to 25% when they embrace it. Small and Medium-sized Enterprises (SMEs), India's economic spine, stand to gain big from that 25% productivity lift. That's the lure that AI promises – efficiency and flexibility.

In European countries as well as the U.S., the hourglass model is taking hold fast. A Gartner report forecasts that by 2026, one in five companies there will use AI to slash over half their middle managers, saving costs while boosting output. High wages – around $35 an hour in the U.S. versus $1-$2 in India, according to the International Labour Organization – make automation a smart bet. Big players use AI to monitor workers or streamline onboarding, pushing for flatter, tech-savvy setups.

Is India adapting?

India's path is its own. Cities like Bengaluru and Hyderabad pulse with AI innovation, yet India ranks 72nd on the International Monetary Fund's AI Preparedness Index with a score of 0.49, far behind the U.S. (0.77) or Singapore (0.80). The lag stems from uneven infrastructure – rural areas lack the connectivity urban hubs enjoy – and a cultural lean towards hierarchy that's hard to shake.

Indian firms aren't diving fully into the hourglass; they're testing it with a hybrid spin. E-commerce leaders like Flipkart and Reliance Jio use AI to predict buying trends or iron out delivery kinks, but they keep layers of managers to tackle India's diverse, multilingual markets. Lower labour costs ease the pressure to cut middle roles, and our respect for authority slows the shift to flatter organisational structures. A report by World Business Culture highlights how Indian businesses echo our society's top-down ways, making big change a tough sell. This hybrid tack isn't a retreat – it's a strategic play, blending AI's perks with what already works.

The perks of such blending are real and enticing. Efficiency tops the list. A Surat textile maker could use AI to forecast fabric demand, slashing waste and boosting profits. Innovation follows close behind. AI tools speed up coding for tech firms, freeing staff to come up with new solutions. The NNG Group found that generative AI boosts task performance by 66%, a hint of what it could do for the Indian IT sector. Flexibility's another win – pharmaceutical companies leaned on AI during the pandemic to navigate supply chain chaos, showing its value in difficult times. Add in better customer and employee experiences – banks roll out 24/7 chatbots, payroll automation frees up staff duties – and you've got a compelling case. Additionally, it also brings in an array of new roles, such as AI experts and data ethicists, with demand set to hit 1.25 million by 2027, per Deloitte and Nasscom.

Myriad challenges

But the road's not all rosy. Jobs hang in the balance, especially for middle managers and the less skilled. Pew Research pegs 19% of U.S. workers with high exposure to AI, and globally, up to 800 million jobs could shift by 2030. In India, where steady work props up millions, this could widen gaps – non-graduates and older workers would face the brunt. While LinkedIn states 94% of Indian firms plan to reskill their workers, it's going to be a tall order.

Ethics throw up another snag. AI can stumble with bad data, a worry in our diverse nation – think skewed loan calls or hiring picks. Another worry is transparency; 79% of Indians dislike their data being sold off, as per ISACA. While the Digital Personal Data Protection Act, 2023 aims to curb this, it's still finding its feet.

Infrastructure's a sticking point too. With 65% of Indians in rural areas and many offline, AI's reach is cramped. Moreover, bringing in AI infrastructure isn't cheap, and not every firm will be able to afford it. Culture adds a twist. Our love for hierarchy, especially in family businesses, jars with the hourglass push. Flattening things risks pushback from workers and bosses wedded to the old ways. It's not just technology – it's people as well.

What should be done?

Start with reskilling – train staff in AI basics, data skills, and problem-solving; Skill India's digital courses are a launchpad. Next, adopt a hybrid model – use AI for analytics or customer chats, and keep humans for the big decisions. Then, lay down ethical guidelines – set rules for fair, open AI, with checks to dodge bias and build trust, as per the OECD guidelines. Team up with Western firms for know-how, tailoring it to India's needs, like affordable tech for SMEs. Additionally, know that AI is a journey, and not a fix; track cyber risks and regulatory shifts to keep ahead.

India's hourglass won't ape the West – it'll be our own blend, fusing AI's power with our economic and cultural roots. By doing so, we could lead in AI-driven business. A Centre for Economic Policy Research study flags a 0.5-0.6% productivity bump from AI in Japan – India could see the same. It's about time we start syncing tech with human grit and India's unique rhythm. For our firms, this should not be just a trend – it's a chance to rethink work, value, and how 1.4 billion of us shape the future.

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Understanding the Hourglass Model:

- **Top layer (Executives):** Focus on long-term strategy without managing operational coordination.
- **Middle layer (Managers):** Shrinks as AI takes over scheduling, performance tracking, and data-driven decisions.
- **Bottom layer (Workers + AI tools):** Execution driven by real-time analytics and collaboration between humans and machines.
- The model reflects flattened hierarchies, increased automation, and reliance on algorithmic decision-making.

Potential for Indian Businesses:

- **Productivity Boost:** AI adoption can lead to a 25% rise in productivity; huge implications for SMEs.
- **Innovation:** AI accelerates product development, coding, logistics, and customer experience.
- **Flexibility:** Adaptive AI systems helped pharmaceutical supply chains during COVID-19 disruptions.
- **Job Creation in New Areas:** Demand for AI engineers, data scientists, and data ethicists is rising — 1.25 million AI-related jobs expected by 2027 (Deloitte-NASSCOM).

Challenges Unique to India:

1. Employment Disruption:

  - Middle managers and low-skilled workers are at high risk.
  - Older workers and non-graduates could face unemployment.
  - Although 94% of Indian firms plan to reskill workers (LinkedIn), implementation remains weak.

2. Cultural Resistance:

- Deep-rooted respect for hierarchy in family-run and traditional businesses resists flattening.
- Change in organizational culture may face institutional inertia.

3. Infrastructure Gap:

- Rural-urban digital divide limits AI's reach; over 65% of Indians live in rural areas, many still offline.
- AI adoption requires high upfront investment; not feasible for all MSMEs.

4. Ethical and Legal Concerns:

- Risk of algorithmic bias in hiring, lending, etc.
- Data misuse fears: 79% of Indians are concerned about their personal data being sold (ISACA).
- Digital Personal Data Protection Act, 2023 is still evolving and requires robust enforcement mechanisms.

Global Comparisons:

- U.S. and Europe: AI adoption is faster due to higher wages and more mature digital ecosystems.
- By 2026, 20% of Western firms are expected to automate over half their middle management.
- India ranks 72nd on IMF's AI Preparedness Index, highlighting need for capacity-building.

Way Forward for India:

1. Skill Development:

- Upskill workers in AI literacy, data handling, and problem-solving.
- Leverage schemes like Skill India and PMKVY for inclusive capacity building.

2. Hybrid Approach:

- Blend AI with human oversight: use AI for routine analytics, but retain humans for judgment-heavy tasks.
- Useful for multilingual, complex Indian markets.

3. Ethical AI Governance:

- Formulate AI ethics frameworks — fairness, transparency, accountability.
- Align with OECD AI principles and promote awareness among developers and users.

4. Affordable AI Infrastructure:

- Government and industry must collaborate to provide low-cost AI tools for MSMEs.
- Encourage public-private partnerships and AI incubators in Tier-2, Tier-3 cities.

5.Inclusive Policy & Regulation:

- Ensure policies promote both innovation and protection, balancing growth and worker security.
- Monitor cybersecurity risks, privacy breaches, and algorithmic discrimination.

Conclusion:

- AI presents a transformative opportunity for India to rethink not just workflows, but the very architecture of its workplaces. The goal is not to mimic Western models, but to craft an India-specific AI framework—combining technological innovation with social inclusivity, ethical governance, and economic resilience. The journey from pyramid to hourglass must be strategic, humane, and future-ready.

UPSC Mains Practice Question

Ques: . The transition from pyramid to hourglass in workplace structures due to AI is both an opportunity and a challenge for India. Discuss. **(250 words)**

Page : 08 Editorial Analysis

A caste census is not a silver bullet for social justice

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Census data have long been the backbone of public policymaking in India, offering critical insights into sectors such as health, education, employment and housing. In this context, the Narendra Modi government's recent announcement to include caste enumeration in the upcoming national Census has drawn considerable attention. For many, it represents a long-overdue move toward collecting substantive statistical data that are necessary to better address the needs of the Other Backward Classes (OBCs). However, the disproportionate emphasis placed on the caste census raises concerns about the intent and the commitment of the ruling dispensation. It suggests that the formulation of welfare policies for marginalised communities has been unjustifiably deferred under the pretext of awaiting more precise data.

The merit of caste census

Proponents of a caste census argue that it will provide empirical grounding to assess the socio-economic status of various caste groups, particularly the OBCs. They believe that this data will enable more targeted affirmative action and help the state legitimise welfare programmes in the eyes of the judiciary, which has sometimes questioned the reliability of surveys and commission reports. Additionally, disaggregated data within the OBC category could help identify intra-group socio-economic inequalities, thereby informing new policies for the Extremely Backward Classes (EBCs) within the OBCs.

While these arguments are not without merit, they risk overstating what a caste census can achieve on its own. Caste enumeration should certainly be a regular institutional practice in a diverse society such as India. But to elevate the Census data as a precondition for social and economic justice or as the central document for policymaking is a flawed and potentially dangerous misreading of its purpose.

The Registrar General of India's role is to collect and present neutral, factual data and not to direct the government to design social welfare policies. Elevating the Census into a tool for political reform burdens the institution beyond its mandate and risks politicising its work. It is vital to maintain the objectivity of Census operations, especially in a polarised political environment. Importantly, it is the responsibility of the ruling political elites to have public policies for the welfare of vulnerable social groups, based on the available sources of information and empirical evidence.

To elevate Census data as a precondition for social and economic justice or as the pivot for policymaking is a flawed and dangerous misreading of its purpose

Empirical evidence

More crucially, policies for social justice have historically not waited for perfect data. Landmark initiatives such as reservations, land reforms, and the implementation of the Mandal Commission's recommendations were driven not by statistical revelations but by political struggle, mass mobilisation, and the moral commitment of the ruling political class. Public policy in India is often shaped more by electoral strategies, ideological inclinations, and public pressure than by spreadsheets or survey graphs. For example, the Modi government's decision to implement the reservation policy for the Economically Weaker Sections (EWS) was not based on any substantive statistical data or commission report. Instead it only shows that the ruling dispensation has an authoritative power to execute such policy.

Moreover, extensive data about caste-based inequality already exists. Since Independence, Scheduled Castes (SCs) and Scheduled Tribes (STs) have been part of the decennial Census. But Census and complementary national surveys (such as the National Sample Survey Organization/Office, National Family Health Survey) continue to highlight their persistent educational, economic, and social disadvantages. The National Crime Records Bureau has documented a consistent rise in crimes against these communities – from sexual violence to atrocities under the SC/ST (Prevention of Atrocities) Act.

Likewise, the Bihar Caste Survey and the earlier Socio-Economic and Caste Census (SECC) have laid bare the deep economic vulnerabilities and heterogeneity within the OBC category. These reports show that a vast majority of OBCs remain stuck in informal, insecure, low-income employment, with little to no social security or opportunity for mobility.

Despite this abundance of data, the central government has yet to implement bold or transformative policy reforms. For OBCs in particular, there remains a conspicuous policy vacuum at the national level. Importantly, multiple academic researches and reports have demonstrated that in influential sectors of private economy (corporates, the IT industry, and media houses) the representation of SCs/STs and OBCs is marginal. However, no substantial measures have been taken to increase their representation in such institutions of power and privileges. Also, they lack participation in state-run institutions especially in higher education, the judiciary and the top bureaucracy.

Social justice needs robust political will

Available empirical evidence using various surveys, reports and research highlights a fundamental truth – that data does not necessarily drive public policy. Instead, it is the intent of the governing class and people's democratic pressure that crafts public policy. A caste census may help sharpen the diagnosis, but it cannot administer the cure. Data is only the map; it cannot chart the journey by itself. If India is to move toward a more just and inclusive future, the focus must remain on the moral and political imagination of its ruling class. Without political will, empirical evidence remains inert. The real test of the current national government lies not in collecting information on caste-based socio-economic stratification, but in executing effective policy measures, with courage and commitment, for the welfare of the worst-off social groups.

Paper 02:Social Justice

UPSC Mains Practice Question:Critically examine the role of a caste census in advancing the goal of social justice in India. (250 words)

Context :

- The Indian government's recent announcement to include caste enumeration in the upcoming national Census has ignited a debate. While many see it as a long-pending step for addressing OBC welfare, critics caution that it may be overstated, politicised, and insufficient on its own to ensure social justice.

What is the Caste Census Debate About?

- A caste census is expected to provide empirical data on the socio-economic status of various caste groups, especially OBCs.
- Supporters believe it will enable better targeted welfare, affirmative action, and help in gaining judicial legitimacy for such policies.
- However, concerns are being raised that this emphasis is being used to delay welfare reforms, waiting for "perfect" data that may not be necessary to begin with.

Key Arguments in Favor of the Caste Census:

- Will help identify intra-OBC inequalities, benefitting sub-categories like Extremely Backward Classes (EBCs).
- Offers data-based legitimacy to policy actions questioned by the judiciary.
- Adds granularity to welfare targeting, making affirmative action more effective and accountable.

Criticism and Limitations Highlighted:

1. Over-reliance on Data is Problematic:

- Public policies have historically been shaped more by political will, mass movements, and moral convictions than by data.
  - Landmark initiatives like land reforms, reservation for SC/STs, and Mandal Commission were not based on "complete" data.

2. Existing Data is Underutilized:

- SCs/STs are already part of decennial Census and other surveys (NFHS, NSSO), which consistently show persistent socio-economic disadvantage.
- SECC 2011 and Bihar caste survey exposed vulnerabilities in the OBC segment.
- Despite this, transformative policy action has remained absent.

3. Institutional Underrepresentation Remains Unaddressed:

- SCs/STs/OBCs remain marginal in private sector jobs (corporates, IT, media).
- Public institutions like higher education, judiciary, and civil services still show poor representation.
- Structural inequalities persist despite the availability of ample data.

Fundamental Argument: Social Justice Needs Political Will, Not Just Data

- Caste census is a diagnostic tool, not a remedy.
- Without intentional governance and democratic accountability, data alone cannot deliver justice.
- Empirical evidence should support, not delay, welfare initiatives.

Conclusion:

- A caste census can enhance visibility of social inequities and sharpen targeting, but it is not a silver bullet. True reform requires political imagination, moral leadership, and proactive action. In the absence of strong political will, data risks becoming decorative rather than directive. India's challenge lies in ensuring that information leads to inclusion, not inertia.