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Two Failures in a Row — What PSLV's Stage 3 Anomalies Mean for India's Space Economy

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CURATED & WRITTEN BY

Bharat Choudhary

UPSC Educator & Content Creator •
linkedin.com/in/epicbharat

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INTERVIEW ANGLE

"ISRO's PSLV has suffered two consecutive Stage 3 failures. What does this mean for India's commercial launch ambitions, and how should ISRO reform its failure investigation and quality control processes?"

WHY IN NEWS

ISRO's PSLV-C62 failed on January 12, 2026 — the second consecutive PSLV failure involving a Stage 3 anomaly, after PSLV-C61 in May 2025. Sixteen satellites, including the primary Earth observation payload EOSN1, were lost. The back-to-back failures raise fundamental questions about quality control in ISRO's most trusted rocket.

THE EXCEPTIONAL HAS BECOME A PATTERN

PSLV was, until 2025, one of the world's most reliable rockets. Across 63 flights since 1993, it had succeeded 62 times — a failure rate of less than 2%. In the commercial satellite launch market, where insurers, operators, and mission planners make multi-year decisions based on reliability statistics, that record was PSLV's strongest selling point.

Two consecutive failures — both attributable to Stage 3 — change that calculus entirely. A single anomalous failure can be explained as a statistical outlier. Two failures with a **common mode** (same stage, similar symptom category) suggest a **systemic problem**: either in design, in materials, in manufacturing quality control, or in the failure investigation process that should have prevented the second failure after the first.

The question ISRO must answer — honestly and publicly — is not just "what caused PSLV-C62 to fail?" but "why did the PSLV-C61 failure investigation fail to prevent PSLV-C62 from failing?"

THE COMMERCIAL STAKES

India's space economy is projected to grow to **US$ 44 billion by 2033** (from approximately US$ 8 billion today). The growth depends heavily on commercial satellite launches — ISRO/NSIL competing with SpaceX Falcon 9, Arianespace Ariane 6, and eventually China's commercial Long March variants.

PSLV's position in this market was built on three advantages:

Reliability — now severely damaged

Cost-effectiveness — PSLV launches at approximately US$ 15–25 million vs Falcon 9 at US$ 60–70 million for a dedicated launch

Flexibility — PSLV's Sun-Synchronous Orbit (SSO) specialty serves the dominant smallsat market

The damage to commercial credibility is not just reputational. Commercial satellite operators manage **launch risk** through insurance. Post-failure, PSLV's insurance premiums will rise — potentially eroding its cost advantage and pushing price-sensitive customers to SpaceX's increasingly competitive Transporter rideshare missions.

THE PRIVATE SECTOR QUESTION

India's space sector liberalisation — driven by IN-SPACe (Indian National Space Promotion and Authorisation Centre, established 2020) — was designed to build a private commercial launch ecosystem alongside ISRO. **Skyroot Aerospace's Vikram-S** (November 2022) was the first private Indian rocket to reach space. Agnikul Cosmos, Bellatrix, and others are developing their own launch vehicles.

The PSLV consecutive failures paradoxically create an opportunity for the private sector: if ISRO's reliability is in question, the case for diverse, redundant Indian launch options becomes stronger. The government should accelerate regulatory approvals, launch range access, and testing facilities for private launchers rather than treating PSLV's recovery as the only priority.

At the same time, private launchers cannot yet replace PSLV for medium and heavy payloads. The near-term commercial gap will likely be filled by foreign launchers — a setback for India's launch self-sufficiency goals.

ISRO'S FAILURE INVESTIGATION — A PROCESS QUESTION

ISRO's **Failure Analysis Committee (FAC)** process, modelled partly on NASA's mishap investigation procedures, is meant to independently assess failure causes and certify the root cause before approving return to flight. After PSLV-C61 (May 2025), a FAC would have been constituted and its recommendations implemented before PSLV-C62 was cleared for flight.

The fact that PSLV-C62 also failed at Stage 3 suggests one of several possibilities:

The FAC identified the wrong root cause for PSLV-C61

The FAC identified the right cause but the corrective actions were not fully implemented

There are **multiple distinct causes** for Stage 3 failures — the C61 cause was correctly identified and fixed, but a different Stage 3 vulnerability existed that manifested in C62

Quality control at the propellant manufacturing or motor assembly level has systemic weaknesses that are not being caught by inspection protocols

Option 4 is the most concerning, because it implies a **systemic process failure** rather than an isolated technical one.

THE BROADER LESSON — RELIABILITY REQUIRES PROCESS CULTURE

Reliability in rocketry is not primarily achieved through better design (though design matters). It is achieved through **process culture** — the relentless, systematic application of quality protocols at every stage of manufacturing, assembly, testing, and integration. SpaceX's Falcon 9 — now approaching 400 consecutive successful flights — achieved its reliability not by having a perfect design but by building an obsessive process culture around catching defects before flight.

ISRO's institutional culture has always celebrated the genius of its engineers and scientists. The PSLV consecutive failures should prompt a quieter, more uncomfortable question: does ISRO have a process culture that catches manufacturing defects as rigorously as it designs excellent rockets?

If the answer is no — or even "not consistently" — then the path back to reliability runs through quality management systems, inspection protocols, and supplier accountability, not just through better engineering.

UPSC RELEVANCE

Prelims: PSLV-C62 (Stage 3; January 12, 2026; 16 satellites lost; EOSN1; Sriharikota); NSIL (NewSpace India Limited); IN-SPACe (2020); India space economy US$ 44 billion target; Vikram-S (Skyroot Aerospace, first private Indian rocket, 2022).

Mains GS-3: India's commercial space economy — growth drivers and challenges; ISRO institutional accountability; quality management in public sector R&D organisations; case for space sector liberalisation; comparison of PSLV reliability with global benchmarks.

📌 FACTS CORNER — KNOWLEDGEPEDIA

INDIA'S SPACE ECONOMY:

Current size: ~US$ 8 billion (~2% of global space economy)

Target: US$ 44 billion by 2033 (DoS projection)

Global space economy: ~US$ 546 billion (2023)

Indian Space Policy 2023: governs roles of ISRO, NSIL, IN-SPACe, and private sector

PSLV FAILURE PATTERN:

PSLV-C61: May 2025; Stage 3 anomaly (first consecutive failure)

PSLV-C62: January 12, 2026; Stage 3 roll-rate disturbance (second consecutive)

Both failures: Stage 3 (PS3) — solid propellant stage (uncontrollable once ignited)

Pre-2025 reliability: 62 successes in 63 flights (~98%)

KEY INSTITUTIONS:

VSSC: Vikram Sarabhai Space Centre, Thiruvananthapuram — designs solid propellant stages

SDSC-SHAR: Satish Dhawan Space Centre, Sriharikota — launch complex

NSIL: NewSpace India Limited — ISRO commercial arm; manages co-passenger launches

IN-SPACe: authorises and promotes private space activities; established under DoS (2020)

PRIVATE SPACE MILESTONES:

Skyroot Aerospace: Vikram-S — first private Indian rocket to reach space; November 2022

Agnikul Cosmos: Agnibaan SOrTeD — first private Indian rocket with semi-cryogenic engine; 2024

Pixxel, Dhruva Space, Bellatrix — other Indian private space companies

GLOBAL COMPARISON — LAUNCH RELIABILITY:

SpaceX Falcon 9: ~400 consecutive successes (as of 2026) — gold standard

Arianespace Ariane 5: retired 2023; ~94% success rate over career

PSLV (pre-2025): ~98% success rate across 63 flights

Sources: The Hindu, Spaceflight Now, ISRO

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