

In an Era of Precision Warfare, Can India Afford a Failing NavIC?



BY EARTH NEWS POLITICAL DESK

In the crowded and competitive arena of global space capabilities, satellite navigation systems are no longer mere technological luxuries; they are foundational infrastructure. From guiding civilian transport to enabling precision warfare, these systems sit at the intersection of daily convenience and national security. For India, Indian Space Research Organisation (ISRO)'s ambitious navigation programme—Navigation with Indian Constellation (NavIC)—was envisioned as a decisive step toward strategic autonomy. Yet, more than a decade after its first satellite was launched, NavIC finds itself grappling with a crisis that is as much about policy and planning as it is about technology.

A System Built for Sovereignty

NavIC, originally conceived as the Indian Regional Navigation Satellite System, was designed with a clear strategic intent: to reduce dependence on foreign navigation systems such as Global Positioning System (GPS). The impetus for such autonomy dates back to the Kargil War, when India reportedly faced limitations in accessing reliable GPS data during critical military operations.

Unlike GPS, which operates through a constellation of satellites in medium Earth orbit, NavIC was designed as a regional system. It employs a constellation of satellites positioned in geostationary and geosynchronous orbits, ensuring continuous coverage over India and its immediate neighbourhood. The system offers two services: a Standard Positioning Service for civilian users with accuracy in the range of 5 to 20 metres, and a Restricted Service tailored for strategic and military applications.

The first NavIC satellite was launched in 2013, and by 2018, the system was declared operational. On paper, it represented a significant technological achievement—India joining an exclusive club of nations with independent navigation capabilities.

From Promise to Partial Breakdown

Today, however, the promise of NavIC stands sharply contrasted with its current operational reality. Of the constellation originally intended to ensure seamless coverage, only three satellites are presently functional—below the minimum threshold required for accurate positioning.

The most recent setback came with the failure of the atomic clock aboard the decade-old IRNSS-1F satellite in March this year. Atomic clocks are the heart of any navigation satellite, providing the precise timing necessary for accurate positioning. Their failure renders a satellite effectively unusable for navigation purposes.

This is not an isolated incident. NavIC's trajectory has been marked by a series of technical setbacks. Earlier, the launch of

the next-generation NVS-02 satellite in January 2025 failed to achieve its intended orbit. Investigations revealed that a pyrotechnic valve malfunction prevented the oxidiser from reaching the engine, leaving the satellite stranded in an incomplete orbit.

The Compounding Nature of Failure
Failures are not unusual in space exploration. Even the most advanced space agencies, including NASA and Roscosmos, have faced setbacks. What distinguishes NavIC's predicament is the compounding nature of its failures.



Conceived as a pillar of strategic autonomy, NavIC today reveals a deeper truth—technological ambition without sustained planning can erode critical capabilities. As precision warfare reshapes geopolitics, India's faltering navigation system is not just a technical setback but a stark warning about national preparedness.



In total, six out of the eleven satellites launched under the NavIC programme have suffered either complete or partial failures. Many of these issues have been traced back to faulty atomic clocks—often sourced from foreign suppliers—as well as engine malfunctions, missed command signals, and the inevitable wear and tear of aging hardware.

To describe such a pattern as “jinxed” would be misleading. These are not random misfortunes but identifiable engineering and systems-level shortcomings. Yet, the frequency and clustering of these failures raise uncomfortable questions about reliability and resilience.

This is not a story of a single mission gone wrong but of systemic fragility. Issues with critical components, insufficient redundancy in satellite design, delays in launching replacement satellites, and continued dependence on imported technologies have collectively eroded the constellation's robustness.

Such vulnerabilities are particularly concerning for a system that was conceived as a strategic asset. A navigation system must be dependable, not just functional. Reliability is its core currency.

Strategic Stakes in an Unstable Region
The timing of NavIC's diminished capability could hardly be worse. India's

geopolitical environment is increasingly complex, with evolving security dynamics across West Asia and South Asia. Conflicts in regions such as Iran and Afghanistan underscore the importance of real-time situational awareness.

India's own experience during Operation Sindhoor highlighted the limitations of operating with a partially functional navigation system. In modern warfare, where precision is paramount, even minor inaccuracies in positioning can have significant consequences.

Globally, the nature of warfare has undergone a transformation. Conflicts such as the Russia Ukraine War and the Armenia-Azerbaijan clashes have demonstrated the decisive role of drones, precision-guided munitions, and long-range missile systems. These technologies rely heavily on accurate satellite navigation.

Compounding India's concerns is the strategic advantage enjoyed by its adversaries. China's BeiDou Navigation Satellite System not only offers global coverage but is also reportedly accessible to Pakistan for military use. In parts of the Asia-Pacific, BeiDou's performance is considered superior even to GPS.

In such a scenario, the absence of a fully operational indigenous navigation system places India at a distinct disadvantage.

The Neglected Ground Segment

While much of the attention has been on satellite failures, an equally significant issue lies on the ground. A navigation system is only as effective as its user segment—the receivers, infrastructure, and applications that translate satellite signals into usable information.

In NavIC's case, this segment has lagged considerably. During the early years of the programme, several satellites remained underutilised due to the absence of a comprehensive ground network. This meant that valuable assets in orbit were not delivering their intended benefits on Earth.

Even today, NavIC's penetration into civilian applications remains limited. Although some mobile chipsets have been made compatible with NavIC signals, widespread adoption is yet to materialise. For the average smartphone user in India, NavIC remains largely invisible.

This is a missed opportunity. A robust user ecosystem not only enhances utility but also drives demand, ensuring that the system evolves in response to real-world needs.

Policy Gaps and Planning Deficits

The deeper concern, however, lies beyond technology. The recurring setbacks in NavIC point toward structural issues in policy and planning.

atomic clocks has proven to be a vulnerability. Indigenous development in this critical area has been slower than expected, undermining the system's reliability.

Ambition Versus Consolidation

These challenges invite a broader question about India's space priorities. In recent years, ISRO has achieved remarkable milestones, from lunar exploration to interplanetary missions. The success of programmes like Chandrayaan and Mars Orbiter Mission has elevated India's global standing.

At the same time, the agency is pursuing even more ambitious goals, including human spaceflight under Gaganyaan, plans for a space station, and exploratory missions to Venus.

While these endeavours are undoubtedly significant, they also demand substantial resources—financial, technological, and human. The question, therefore, is one of sequencing and prioritisation.

Has the pursuit of high-visibility, prestige-driven missions inadvertently diverted attention from foundational systems like navigation? Is ISRO attempting to do too much, too quickly, within finite resources?

By contrast, established space powers such as the United States, China, and Russia have historically prioritised the development of core infrastructure—navigation, communication, and surveillance—before expanding into more symbolic or exploratory domains.

Lessons for the Future

NavIC's current predicament should not be seen as a failure but as a critical learning moment. It underscores the importance of viewing space programmes not as isolated missions but as integrated systems requiring sustained attention across their lifecycle.

First, there is an urgent need to restore the constellation to full operational capability. This will require expedited launches of replacement satellites, along with enhanced redundancy in design to mitigate future failures.

Second, India must accelerate the development of indigenous technologies, particularly atomic clocks. Strategic autonomy cannot be achieved without technological self-reliance.

Third, equal emphasis must be placed on the ground and user segments. Encouraging adoption through policy incentives, integrating NavIC into mainstream devices, and building a robust application ecosystem are essential steps.

Finally, there is a need for a recalibrated policy framework—one that balances ambition with consolidation. High-profile missions inspire and elevate national prestige, but they must not come at the cost of critical infrastructure.

A Wake-Up Call, Not a Setback

NavIC was conceived as a symbol of

India's technological maturity and strategic independence. Its current challenges do not diminish that vision but highlight the complexities involved in realising it.

In the end, the measure of a space programme is not just its ability to achieve spectacular milestones but its capacity to deliver consistent, reliable services that underpin national capability.

For India, the path forward is clear. Strengthen the foundations, address systemic gaps, and ensure that ambition is matched by resilience. NavIC's story, far from being one of failure, can yet become a testament to course correction and renewed focus—if the lessons it offers are heeded with the seriousness they deserve.