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After the Applause: India's AI Inflection Decade

By Uday Kumar Varma

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The India AI Impact Summit concluded with declarations, endorsements and a clear normative articulation of human-centric artificial intelligence. But the true significance of the Summit lies not in what was said at Bharat Mandapam, but in what must now be done beyond it.

Declarations create direction. Execution creates parity.

If the Summit marked India's arrival as a convening power in global AI governance, the coming decade would determine whether it can translate convening authority into technological depth. The question is no longer whether India is part of the AI conversation. It is whether she can shape its trajectory — and in selected domains, match or even outpace the established leaders.

That ambition demands clarity about the structural challenges ahead.

The Gaps That Matter

First, the compute gap remains substantial. Frontier AI development today depends on massive GPU clusters, advanced accelerators and sustained energy supply. The United States and China possess deep integration between semiconductor design, fabrication capacity and hyperscale cloud infrastructure. India's data-centre capacity is expanding rapidly, and fiscal incentives for cloud infrastructure are encouraging investment, but the scale differential is still significant.

Second, semiconductor depth is a long-cycle challenge. Even with the expansion of the India Semiconductor Mission and related manufacturing incentives, advanced-node fabrication requires technological mastery accumulated over decades. India's immediate advantage lies in design, materials research and packaging technologies. Converting that into end-to end capability will require sustained policy continuity.

Third, research intensity must rise. Public R&D expenditure as a share of GDP remains modest compared to leading innovation economies. Without globally competitive AI research institutions and long-horizon funding models, India risks remaining primarily an adopter rather than a creator of frontier systems.

Fourth, capital formation for deep technology must mature. AI research and semiconductor ecosystems require patient capital prepared for extended gestation periods. Encouraging such capital — domestic and international — is as critical as regulatory reform.

Finally, talent retention is decisive. India produces a vast engineering workforce annually, yet the global competition for advanced AI researchers is intense. Building world-class laboratories, competitive compensation structures and international collaborations will determine whether brain circulation strengthens or weakens national capability. These challenges are real. But they are not insurmountable.

Why Parity Is Plausible

India enters this phase with structural advantages few nations possess. Its digital public infrastructure demonstrates the ability to deploy technology at population scale. Its entrepreneurial ecosystem has shown remarkable adaptability under constraints. Its demographic depth ensures a continuous pipeline of technical talent. Its expanding data-centre footprint and tax incentives for cloud operations indicate recognition that compute infrastructure is strategic, not incidental.

Most importantly, India has articulated a distinctive normative position. The emphasis on human-centric AI — encapsulated in the MANAV framework — provides philosophical coherence to policy choices. While frontier model training may remain concentrated globally, the deployment of AI across healthcare, agriculture, financial inclusion, governance and education is where societal transformation will be most visible. In these domains, scale and contextual adaptation matter as much as parameter count. Parity, therefore, need not be defined narrowly as training the largest general-purpose model. It can be defined as achieving comparable depth in applied AI systems, semiconductor design capabilities, resilient supply chains and global standard-setting influence.

Indeed, in certain domains — inclusive digital architecture, large-scale AI deployment in multilingual societies, cost-efficient innovation — India may pioneer models that advanced economies adapt.

The Decisive Decade

The period from 2026 to 2036 will be decisive. If India is to close the structural gap with the United States and China in meaningful respects, several conditions must align.

R&D expenditure must rise steadily and predictably, crossing thresholds that allow sustained institutional growth rather than episodic grants. Two or three globally recognised AI research centres, integrated with industry and international networks, could anchor national capability.

Domestic high-performance compute clusters must expand, supported by renewable energy integration to ensure sustainability. Semiconductor initiatives must progress from incentives to ecosystems — linking research institutions, fabrication facilities, design houses and materials science laboratories.

Regulatory clarity, including tax certainty for IT and cloud services, must remain stable enough to attract long-term capital. Policy oscillation would be costlier in deep technology sectors than in most others.

Finally, diplomatic engagement must extend beyond summit declarations. India's growing influence among developing nations positions it uniquely to shape AI adoption frameworks across the Global South. Standard-setting, training partnerships and shared infrastructure models could amplify its global standing far beyond its domestic market.

If these strands converge, parity becomes plausible — not inevitable, but structurally grounded.

From Presence to Power

The AI Impact Summit marked India's arrival as a consequential voice in global AI governance. The more demanding task now is consolidation — of technological capability, economic depth and normative influence.

Nations that combine demographic scale, expanding infrastructure, political clarity and technological ambition seldom remain peripheral for long. India today possesses all four. The variable is no longer possibility, but pace — the speed and coherence with which these elements are integrated into a sustained national strategy.

The decade ahead will not be measured in declarations or diplomatic communiqués. It will be measured in research ecosystems strengthened, semiconductor capacity operationalised, compute clusters scaled, startups capitalised and policy frameworks maintained across electoral cycles. Execution, not endorsement, will define credibility.

India does not need to replicate the trajectories of the United States or China to stand alongside them. It must define its own model — one that fuses scale with inclusion, capability with responsibility, and innovation with democratic legitimacy. That synthesis, if achieved, could itself become a template for much of the world.

The Summit articulated intent. The years ahead must demonstrate endurance. If policy coherence holds and investment compounds, parity with established AI powers will not remain aspirational; it will emerge across multiple domains. The question is no longer whether India belongs in the AI century. It is how quickly the century begins to reflect her imprint.

When Missiles Speak and Narratives Roar: From Kuwait 1990 to the New West Asian Brink

By - Dr. Santhosh Mathew

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On the night of August 2, 1990, Saddam Hussein unleashed nearly 150,000 troops—backed by tanks, armored vehicles, and missile launchers—across the Kuwaiti border. Within two days, the small and militarily weak Kuwait collapsed. As Iraqi forces closed in on Dasman Palace, the Emir Jaber Al-Ahmad Al-Sabah fled toward Saudi Arabia, while his brother Sheikh Fahad was killed and his body desecrated in a chilling display of power. Kuwait was swiftly annexed into Iraq's Basra province under a puppet regime. The world responded. The United Nations Security Council demanded Iraq's unconditional withdrawal. When Saddam refused, a deadline was set—January 15, 1991. Defiance continued. On January 17, U.S.-led coalition forces began massive missile strikes, marking the beginning of the Gulf War. In a desperate gamble, Saddam launched missiles at Israel, hoping to fracture the Arab coalition and rally regional support. As later revealed by his foreign minister Tariq Aziz, Saddam believed attacking Israel would ignite pan-Arab solidarity. It failed.

Arab states like Saudi Arabia, Bahrain, and others, fearing Saddam's expansionism, backed the U.S.-led coalition. By February 21, ground operations began, and within a week, Saddam conceded defeat. But retreat came with destruction—Kuwait's oil wells were set ablaze, triggering one of the worst environmental and energy crises of the century. Oil prices surged, echoing the shocks of the 1970s.The consequences were not confined to West Asia. The ripple effects reached India, then teetering on the brink of economic collapse. Foreign reserves had dwindled to barely two weeks' worth of imports. Political instability compounded the crisis, with fragile coalition governments and shifting alliances. In a historic moment, India pledged gold to the Bank of England to stave off default.

What followed reshaped the nation. Under Prime Minister P. V. Narasimha Rao and Finance Minister Manmohan Singh, India abandoned its rigid command economy and embraced liberalization. The crisis became the crucible of modern India's economic transformation. From a struggling state, India emerged as a rising global power—proof that wars, though destructive, can trigger constructive shifts. Fast forward to today, and history seems to echo with greater intensity. The ongoing tensions involving Iran, Israel, and the United States are not just military confrontations—they are battles of narratives, perception, and information warfare.

Iran, a 5000-year-old civilization, geographically vast—almost half the size of India and comparable to the combined territories of France, Spain, Germany, and the UK—stands at the center of a volatile geopolitical storm.

Recent developments suggest a dangerous escalation. Following Israeli strikes on Iran's South Pars gas field—the world's largest—Tehran has warned of retaliatory attacks on oil installations across Saudi Arabia, UAE, Qatar, and Kuwait. Such a move could trigger a global energy catastrophe far exceeding previous oil shocks. Compounding fears, statements from Donald Trump and Marco Rubio hint at imminent escalation. Trump has claimed Iran could assemble a crude nuclear weapon within days using enriched uranium stored in deep underground facilities near Isfahan. He has even suggested the possibility of a commando-style operation—akin to the U.S. raid that killed Osama bin Laden—to neutralize the threat.

But this is not merely a war of missiles; it is a war of information. Competing narratives, psychological operations, and propaganda shape global perception. Each side seeks legitimacy while delegitimizing the other. Social media amplifies fear, half-truths, and strategic leaks. In such an environment, truth becomes the first casualty. The International Atomic Energy Agency has already warned of potential radiation risks following strikes near Iran's Bushehr nuclear facility. Meanwhile, Iran's Revolutionary Guards reportedly possess thousands of missiles, now increasingly under the control of hardline factions after the elimination of moderate leadership.

This unfolding crisis fits eerily into the framework of the Thucydides Trap—where a rising power challenges an established one, often leading to inevitable conflict. Iran's regional ambitions and America's strategic dominance create a classic case of this ancient geopolitical pattern. Yet, amid this chaos, there is space for an alternative path. Narendra Modi's concept of "dharma diplomacy" offers a framework rooted in balance, moral pragmatism, and civilizational wisdom. It recognizes a fundamental truth: nations have no permanent friends or enemies, only permanent interests—but those interests must align with a broader vision of global well-being.

War, as history shows, is both destructive and transformative. The Gulf War reshaped global energy politics and catalyzed India's economic rise. The current crisis, if unchecked, could devastate economies, disrupt energy supplies, and destabilize entire regions. But if navigated wisely, it could also redefine global alliances and diplomatic norms. As missiles fly and rhetoric intensifies, the real battlefield lies in perception. Whoever controls the narrative may not just win the war—but shape the world that emerges after it.

The Khanani Network of Hawala, Counterfeit Currency, and the Economics of Shadow Warfare

By Vipul Tamhane

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For nearly three decades, an invisible financial architecture functioned behind the scenes of the formal global banking system, transferring billions of dollars across borders without any records, oversight, or accountability. The Karachi-based hawala network Khanani & Kalia International (K&K) served as the main operational center through which researchers could study how transnational organized crime networks fund terrorism while using state-sponsored secret operations as their funding method.

The Architecture of a Shadow Economy

The brothers Javed and Altaf Khanani established K&K as an informal remittance service during the 1980s, which later became a major non-traditional financial institution.

The network at its highest capacity supposedly managed approximately 40 percent of Pakistan's unrecorded foreign exchange operations, which facilitated the laundering of $16 billion each year according to U.S. Treasury reports. K&K operated through its locations in Dubai, Hong Kong, London, and New York because it used the hawala system's basic mechanism, which allowed value to be transferred through trust-based ledger adjustments instead of needing physical currency to move, thus making its operations undetectable by standard transaction monitoring methods.

The network's client base illustrates the convergence of criminal ecosystems that characterises mature illicit finance operations. The entities that have established credible connections to K&K services include Colombian and Afghan narcotics syndicates and Lashkar-e-Taiba and Jaish-e-Mohammed and Al-Qaeda and the Taliban and Dawood Ibrahim's D-Company. Intelligence assessments further alleged the network's use by Pakistan's Inter-Services Intelligence for covert operational funding, including the financing of insurgent activities in Jammu & Kashmir, demonstrating how state and non-state illicit finance can share the same infrastructure.

Counterfeit Currency as an Instrument of Economic Warfare

The Khanani operation's most important strategic aspect was its supposed involvement in Project Karachi which aimed to inundate Indian markets with top-quality fake currency. From 2005 to 2016 approximately ₹1,500-2,000 crore of counterfeit ₹500 and ₹1,000 notes entered Indian markets each year through distribution networks that operated from Dubai and Nepal and Bangladesh. Detection rates stayed below 10 percent because the counterfeiters duplicated watermarks and security threads and paper quality with almost complete accuracy.

The strategic logic was straightforward: currency destabilization works as an economical military tactic that generates high economic impacts. The effects that followed created inflationary pressure and reduced institutional trust and included terror financing which operated through payments to stone-pelters and sleeper networks, these factors advanced systemic destruction which military forces and diplomatic methods could not effectively address. The ongoing debate over De La Rue, the British currency security firm, remains unresolved because the Reserve Bank of India terminated its contract with De La Rue in 2010 due to quality issues but restored the contract in 2012. The timing of Pakistan's counterfeit capability improvement relative to these contractual shifts remains a matter of active institutional scrutiny, including a CBI investigation involving a former Finance Secretary.

Demonetisation as Strategic Disruption

On 8 November 2016, India's demonetisation of ₹500 and ₹1,000 notes constituted, whatever its domestic economic calculus, a structurally decisive intervention in this shadow ecosystem. The overnight invalidation of the currency denominations central to counterfeit operations and hawala settlement simultaneously nullified an estimated ₹1,500-2,000 crore in fake notes, collapsed terror financing channels reliant on those denominations, and severely disrupted hawala operators whose conversion and recycling mechanisms depended on them. The reported decrease of stone-pelting incidents in Kashmir showed a drop of approximately 43 percent during the following year which demonstrated operational impact although the sources of this effect remain disputed.

What decades of law enforcement coordination and bilateral diplomacy had failed to achieve was accomplished through a single monetary policy instrument, albeit at significant domestic economic cost. The episode raises a consequential question for financial crime policy: under what conditions do macroeconomic interventions constitute more effective counter-terrorism financing tools than conventional investigative or regulatory mechanisms?

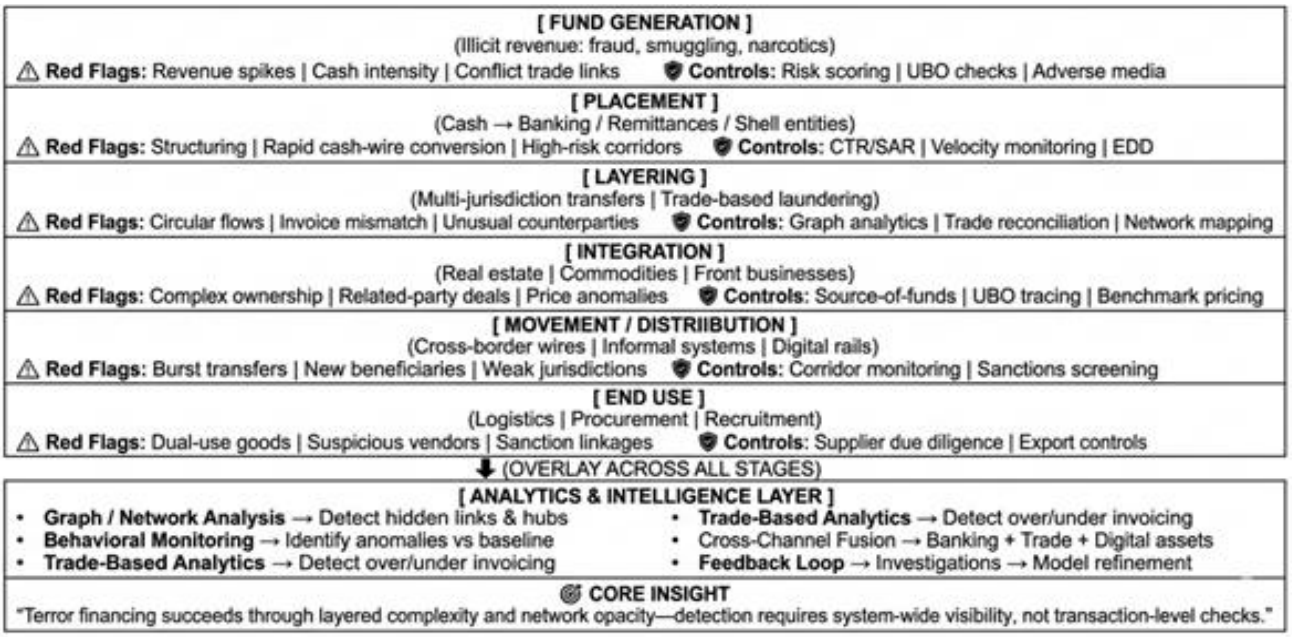

Fig. 1 Terrorism Financing Lifecycle - Detection & Control Architecture

Architecture of Dirty Money

This demonstrates how terror financing operates through multiple suspicious transactions which create operational paths to evade detection methods which protect against final security measures. The Khanani network shows this principle through its operations because criminals create monetary systems which start from illegal activities, use hawala networks and fake businesses to hide their trackable funds, and finally, their dirty money gets transformed into real estate and front operations. The operation remains challenging to disrupt because its system architecture functions as its main protection mechanism. The first step of operations appears to have full legal status at its first phase of development. The initial step of the process requires a cash deposit to proceed. The second step involves executing a cross-border wire transfer. The third step requires purchasing a property.

The framework shown in Fig. 1 makes the essential point: transaction-level checks and controls are necessary, yet insufficient. The system needs complete multi-agency visibility to detect fraudulent activities which require cross-dept-INT analytics to find hidden connections between data points, trade reconciliation to identify systemic frauds and evasions, and cross-channel fusion to link banking and non-banking legal/contractual transactions with trade activities and digital transactions.

The process of fighting terror financing requires more than searching for specific evidence. The process needs investigators to acquire complete knowledge about all components of operations to analyse a correct line of investigation to initiate towards the right direction.

The Lessons of Shadow Finance

The Khanani case demands more than retrospective analysis. It illustrates that illicit financial networks achieve durability not through volume but through structural complexity, fewer, larger, and more layered transactions that reduce detection probability unless network-level intelligence is applied across jurisdictions simultaneously. The 2015 U.S. Treasury designation of Altaf Khanani and his subsequent conviction on money laundering conspiracy charges in 2017 confirmed the network's scale, yet also exposed the latency inherent in reactive enforcement frameworks.

As energy crises, sanctions regimes, and geopolitical shocks continue to generate the opacity that illicit finance requires, the Khanani precedent remains urgently relevant: shadow economies do not merely exploit instability, they are engineered to scale within it.

End Game - Iran War as of 21.03.2026

By Sardar Sanjay Matkar

The author is a geopolitical analyst and former defence contractor with the US and intelligence professional with over four decades of operational and strategic experience across conflict zones and policy corridors worldwide.

As of today, 21 March 2026; it is clearly evident that the Iran war is not going in favour of the USA or its master, Israel. While the American President's inner circle has been reportedly trying to open communications with Iran for a cease-fire, messages that have been ignored by the Iranians; Israel has expanded the war with the invasion of Lebanon, while continuing its ongoing war against Iran and the Houthis.

No army and no nation can continue in a prolonged conflict without a rising cost in human lives lost and money expended. While Israel has not specifically asked the USA for any financial assistance to expand the current war, the U.S. President is negotiating with his Congress for US $ Two Hundred Billion in additional funding for the current Iran war. Given the historical defense financial ties between Israel and the USA; should the U.S. Congress approve of any budget for this war, it will most probably mean that Israel will also benefit from this dole-out.

As of today, this war seems to be acquiring the character of a long-drawn, endless war, just like the earlier wars of Iraq and Afghanistan. There is a lot of international discussion in Western think-tanks that Israel's leadership under Nethanyahu might resort to the use of nuclear weapons to bring about the destruction of Iran and to put Israel in the position of solely dominant power in the middle east. It is believed that Israel has around 300 nuclear warheads and the capability of deploying tactical warheads in the 10-kiloton range; when Netanyahu deems it necessary to utilize against Iran when Israel runs out of conventional warfare strategies and patience. The nuclear option is currently a "wild card" that might or might not be played. From a realistic viewpoint this would be suicidal for Israel since the nuclear fall-out would not be confined to the borders of Iran and will spread across the region. The GCC countries, which are already under pressure from the Iranian strikes will face an existential threat for no fault of their own. The Persian Gulf, from where most of the Arabian Peninsula draws its desalinated water, would be contaminated. Israel, Iraq, Lebanon and Jordan would all be in the fallout zone. Therefore, unless Netanyahu and his close associates achieve complete insanity, the nuclear option might just remain a deterrent for the time being.

But, for Netanyahu a prolonged conflict is not welcome. By nature, he is a sociopath and a narcissist, whose life revolves around his own survival, global status and his potential legacy. His efforts over the last forty years have been towards the goal of a 'Greater Israel' wherein he would be the "saviour" of the Jewish people. His own fear of losing his grandiose dream where he would be the king of Greater Israel, serves as a constraint to the use of nuclear weapons, since it is unlikely that he will press the button that will end his own grand ambitions.

So, what might he do to raise the stakes in this current conflict? The assumption of religious scholars is that; consistent with the ideology of the Israeli far-right government that he leads and Israel's fast-growing shift towards religious rule, he might threaten the destruction of the 'Al Aqsa' mosque in the old city of Jerusalem and the rebuilding of the "Third Temple" on that site.

This has been the stated goal of the Jewish far-right for decades and have considered the existence of the Mosque on that site as an obstacle to rebuilding of their coveted Temple. This Third Temple is nothing but a conceptual, future Jewish sanctuary, and is based on the biblical prophecy wherein it is intended to replace the First Temple, built by Solomon, that stood for 410 years before its destruction by Babylon; and the Second Temple, built after the Babylonian exile,

which stood for 420 years until it was destroyed by the Romans in 70 CE, both of which were destroyed on the Temple Mount, the same site on which the Al-Aqsa Mosque now stands, and thus presents a geopolitical challenge to this idea of the Third Temple.

In Israel, the desire to build a Temple on the site of Al Aqsa is not a fringe position of a few Messianic fanatics. The reality is that this is a stated position of Itamar Ben-Gvir, Israel's National Security Minister, and Bezalel Smotrich, Israel's Finance Minister, both of whom belong to the radical Jewish movement that is part of the Netanyahu government and believe that the entire mosque compound as rightfully Jewish and its current status as a temporary injustice waiting to be corrected. They are empowered in their belief by Netanyahu, who uses the religious far-right for his own political survival and self-glorification. He is under no illusion about the destructive capacity he has placed within his own government, or what Ben-Gvir and Smotrich would do if given a free hand. The reality is that many practicing Jews openly fantasize about tearing down a holy structure (the Mosque) that belongs to another faith and calling its destruction as a "divine will."

The consequences of destroying Al-Aqsa would be unprecedented in these modern times. The mosque sits on Haram al-Sharif (Arabic for 'The Noble Sanctuary'), the third holiest site in Islam. It's sacred to approximately 1.8 billion Muslims worldwide. Its destruction would be more than a military action. It would be a declaration of war on Islam itself. Every Muslim majority government in the world will be put into an impossible position, where they will be required to choose between its religious obligations and its geopolitical relationships. Every nation would face angry domestic political situations that might lead to changes in their government's leaderships.

For the Christian Zionist supporters in the USA, this might be considered as an act of salvation. The rebuilding of the Third Temple is a central pillar of the 'End Times theology', which is the study of the "last things" – death, judgement and the final destination of humanity, focuses on the second coming of Jesus and establishment of God's Kingdom according to the tenets of Christianity. Millions of American evangelical voters believe that the rebuilding of the Temple is a pre-requisite for the Second Coming of Christ. Netanyahu would present this as Israel saving the world, standing alone against the forces of Islam and saving Christianity. Donald Trump will endorse this since his own political coalition is supported by the Christian Zionists and he will have every incentive to gain political mileage out of it in the USA.

In my opinion, Netanyahu, who has succeeded his entire life through political manipulation, and who is betting his survival on this war, which he and the USA are already losing; would attempt the destruction of the Al-Aqsa Mosque to reshape the entire narrative. Its destruction, when hidden in the language of biblical prophecy and a conflict between civilizations, would be an Israeli act of irreversible provocation that would prohibit any kind of retreat and irrevocable bind the American politicians to him personally via religious fervour rather than mere strategic and economic interests that are prone to changing with the times. The crowing argument might be that this would be the ultimate symbol of transforming the land of Palestine into an exclusively Jewish one.

Ultimately, the question to be asked is, what will the world's leadership do to ensure that this does not happen. For, if Netanyahu and his close allies actually do indulge in this reckless act of destruction, there is no limits on what the rest of the world would have to endure as retaliation.

From Control to Sovereignty: The Next Phase of the AI Race

By Shruti Rajvanshi

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The global conversation on artificial intelligence is increasingly being reduced to a familiar binary: the United States versus China. It is a compelling narrative but an incomplete one.

AI is not merely a contest between two nations. It is an evolving structure shaped by three distinct forces: private technology companies that own critical infrastructure, governments that seek to regulate and leverage it, and increasingly autonomous AI systems that operate across borders. The intersection of these forces will define the trajectory of the AI era.

At the heart of this shift lies infrastructure. Today, a significant portion of the world's cloud capacity is controlled by three US-based firms: Amazon Web Services, Microsoft Azure, and Google Cloud. These tech giants have, over the past decade, embedded themselves into the digital backbone of economies worldwide. From public services to private enterprises, reliance on their platforms has become structural.

This concentration of technological capacity directly constrains the ability of economies to achieve technological sovereignty.

Recent developments ranging from tightened sanctions on Russia, to export controls on semiconductors to China, demonstrate how access to critical technologies can be shaped by policy decisions. While these measures are often framed in terms of national security, they also underscore a deeper reality: control over infrastructure enables influence over technological growth.

Unsurprisingly, this has triggered a global push towards technological self-reliance.

Countries are beginning to recalibrate their strategies through targeted efforts to reduce dependency. India's central bank-backed cloud initiatives for financial institutions, legislative moves in the Netherlands to limit reliance on US technology providers, and the African Union's Lusaka Declaration all point towards a broader trend: the desire to retain sovereignty over digital infrastructure.

However, infrastructure alone will not determine leadership in AI.

The United States, despite its dominance in foundational technologies, faces a different challenge execution. Policy frameworks and budgetary proposals, such as "One Big Beautiful Bill Act", indicate intent to accelerate AI adoption in Pentagon. Yet, the critical question remains whether administrative systems can translate this intent into rapid, large-scale deployment.

Because the defining factor in the AI race will not be innovation in isolation, but integration at scale within and across the borders.

The countries that lead will be those that embed AI into governance, healthcare, defence, policing, and logistics transforming not just industries, but public infrastructure as well. This requires more than access to compute power. It demands institutional agility, regulatory clarity, and the ability to align public and private sector incentives.

For countries like India, this presents a strategic dilemma. Should AI development be accelerated by building on existing global platforms, accepting a degree of dependency in exchange for speed? Or should the focus remain on developing domestic capabilities, aligned with the vision of Atmanirbhar Bharat, even if that entails slower initial progress?

This is not a purely technological choice. It is a question of long-term strategic autonomy.

Equally pressing is what may be termed the "second-step problem". While many countries like India are still in the process of building AI infrastructure, far fewer have articulated clear pathways for its effective deployment. The transition from capability to application from possessing AI tools to integrating them meaningfully into systems remains uneven and uncertain.

It is within this gap that the future hierarchy of nations will likely be determined.

The global AI landscape, therefore, cannot be understood through a binary lens. It is not simply about who builds the most advanced models or controls the largest data centres. It is about who can balance access with autonomy, and innovation with execution.

The race is not between two countries. It is between competing models of control, collaboration, and capability. And in that race, speed alone will not be enough, direction will matter just as much.

How Thorium can Power India's 100 GWe by 2047 Mission

By - Dr. Anil Kakodkar

The author is the former chairman of the Atomic Energy Commission and now Chancellor of the Homi Bhabha National Institute and Chairman of the Rajiv Gandhi Science & Technology

India holds the world's largest thorium reserves, and thorium use not only offers energy independence but also virtually eliminates proliferation risk.

The SHANTI Act 2025 represents a watershed moment for India's atomic energy programme. It opens the doors of nuclear energy to the public and private sectors, academia and industry alike, fostering an ecosystem that responds to India's needs and opportunities in this field. There is visible enthusiasm among stakeholders. While legislation is an enabler, a conducive regulatory framework, free from monopolistic tendencies, is equally essential to realise our development goals.

The growth of our nuclear generation capacity currently depends heavily on imported uranium. Domestic uranium ores are lean and costly to extract, though this does provide some insulation against supply disruptions. The '100 GWe by the year 2047' nuclear energy mission announced by the Government consists largely of thermal reactors, which would require around 18,000–20,000 tonnes of mined uranium annually — roughly a third of current global production.

By the time India reaches 100 GWe, global nuclear generation capacity is expected to grow from around 380 GWe today to around 1,400 GWe. At that scale, known global uranium resources of around 8 million tonnes could sustain the fleet in once-through mode for only about three decades.

Two conclusions follow: uranium use in once-through mode is not sustainable, and securing our share of global uranium supply will become progressively more difficult.

Thorium recycling as an alternative

Nuclear capacity will need to grow well beyond 2047. Energy demand is perpetual, and fission must play its role, at least until fusion energy arrives at the requisite scale. The solution to uranium supply constraints in once-through mode is nuclear recycling, which increases the energy potential of nuclear fuel 50- to 100-fold. Yet, with a few notable exceptions — France, India, and Russia — most countries have not adopted recycling, citing fears of fissile material diversion for weapons proliferation.

Shifting to thorium recycling changes this situation: India holds the world's largest thorium reserves, and thorium use not only offers energy independence but also virtually eliminates proliferation risk. Resolving the remaining challenges of thorium utilisation is therefore urgent and demands a large, multidisciplinary effort with significant scope for innovation.

FBRs and HALEUs as pathways

India's three-stage nuclear power programme, designed to leverage thorium resources, envisages fast breeder reactors (FBRs) as the stage beyond thermal reactors. The first 500 MWe Prototype Fast Breeder Reactor is almost ready. Beyond this, metal-fuelled FBRs with associated fuel recycling technology must also be developed to achieve the short doubling times needed to support rapid capacity growth. The phase in which fast reactor capacity grows in step with economic demand is, realistically, still about three decades away.

The principal purpose of FBRs is to irradiate thorium at scale and produce the uranium-233 needed for the third stage. While that is delayed, the 100 GWe mission — fuelled largely by imported uranium — is driving Pressurised Heavy Water Reactor (PHWR) capacity well beyond the 10 GWe previously envisaged. This creates a valuable opportunity: irradiating thorium in PHWRs can advance uranium-233 production and accelerate deployment of third-stage Thorium Molten Salt Reactor (TMSR)-based Small Modular Reactors (SMRs). Doing so would recover some lost time and ease the inevitable slowdown in nuclear power growth between the first and second stages.

Large-scale thorium irradiation can, in fact, be carried out in PHWRs with no significant design changes by using thorium in combination with HALEU (high-assay low-enriched uranium) as fuel. This approach offers additional benefits in economics, safety, and, as noted above, proliferation resistance. Most significantly, burnup levels comparable to light water reactors become achievable, leading to considerably less spent fuel and lower back-end costs.

Qualifying such HALEU–thorium fuel requires accelerated irradiation testing and demonstration in actual PHWRs. India currently lacks facilities for accelerated irradiation testing, but existing international cooperation agreements can be leveraged — preferably as genuine partnerships rather than simple vendor–buyer arrangements. On fuel supply, India already imports both natural and enriched uranium; the HALEU supply chain is evolving rapidly, driven by demand from numerous next-generation reactor programmes worldwide.

Alongside the TMSR, SMRs capable of producing low-cost green hydrogen via direct thermochemical routes must also be developed. Both these systems, together with metal-fuelled fast reactors, could share a common back-end technology: the pyrochemical nuclear recycling process. Irradiated HALEU–thorium fuel could likewise be recycled using this approach. These are challenging developments, but achievable with concerted effort. China has already taken the lead. This should be India's priority focus for SMR development — as highlighted in the 2025–26 budget.

One hopes that the broader ecosystem envisaged in the SHANTI Act will soon take shape, and that efforts towards India's energy independence will gain the momentum they deserve.

Read complete article on website indianexpress.com

India is Proud of:

Babytai Kamble (1929 – 2021)

Babytai Kamble, as a Dalit woman, understood the complexities of caste, class and gender-based oppressions and their overlapping nature. As per her "It is the woman who is the doer" She brings forth the struggles and oppression of Dalit women, who have conveniently been silenced and overshadowed in history. She created a space for herself and her community in the world of literature, activism and education. She did so through the standpoint of a Dalit woman, a rarity at the time.

A teacher, entrepreneur, human rights activist and a champion of women's rights, Babytai Kamble's life becomes an example of purposeful determination. An inspiration to many women, Kamble herself was inspired by the life of Dr B.R. Ambedkar and the contributions he made to the Dalit community. Taking his beliefs and morals forward, Kamble not only became a torchbearer of Ambedkar's values and motives but also created her legacy by paving the way for Dalit women in the realms of activism and literature.

A member of the Mahar community, one of the largest marginalized communities in Maharashtra, Kamble began her activism at a young age. She began going to public meetings that were organized by various Dalit activists that inspired her to work for her community. In one such meeting, an activist portrayed women as leaders, which struck a chord with young Kamble. As per societal norms, women in the forefront of was a rare sight. Therefore to hear about the possibility of a woman being in a leadership position encouraged Kamble to follow the same path

Kamble was married off at the tender age of thirteen, which was considered old in those times. Surrounded by poverty and unemployment, it was extremely important for Kamble and her husband to get jobs. Kamble and her husband both started a small business selling grapes. Slowly, they started making profits off of their business, which helped Kamble to support her family financially.

Kamble soon became a part of the Mahila Mandal that Raja Malojiraje Nimbalkar and his wife Lakshmibai formed in Phaltan, Maharashtra. The Mahila Mandal focused on Dalit women's right to education and employment. She alongside other members of the organization fought for social equality for their community. Kamble also ran an ashram for children of the disadvantaged and vulnerable communities that focused on the overall growth and development of those children through education. Being an advocate of human rights, Kamble wanted to pass on the same ideas of social equality and enlightenment to the children of her community.

While selling grapes at her shop, Kamble often used to read stories and narratives from the newspapers she used for packaging. In those stories, the lack of representation of the marginalized, especially Dalit women encouraged her to pen down her own lived experiences. Through extensive reading, note-taking, and utmost secrecy from her husband, Kamble's autobiography, Jina Amacha (The Prisons We Broke) was born.

Through her book, Kamble made a significant achievement in the world of literature. Her book sheds light on the oppression of Dalit women, which lacked in mainstream narratives of literature. Being a woman from a marginalized community doubles the oppression through the virtue of gender and caste. The identification and acknowledgment of the layers of oppression Dalit women face becomes crucial to achieve individual fundamental rights.

Kamble's autobiography becomes a way of reclaiming her identity as a Dalit woman, Kamble created a space for herself in a male-dominated world. The mere process of writing becomes an act of resistance from the atrocities and enormity of the world. By documenting the lived experiences and narratives of her community and individual self, Kamble creates a space for herself not just in the context of Indian literature but also Dalit history. The experiences of marginalized communities which have often been ignored and disregarded by history find room through her work.

She also published a collection of poems in Marathi titled Man Bolata. It mainly focused on the teachings of Ambedkar and the emancipation and empowerment of the Mahar Community.

After her death in 2021, today her teachings, motives, and beliefs of education, unity, and morality become foremost to achieve intellectual freedom. She firmly believed in the urgency of young intellectuals who'd be responsible to bring significant change in their lives as well as in the lives of their community.

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