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BLOCKCHAIN TECHNOLOGY AND LAW

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INTRODUCTION

In public conversations, blockchain is still too often reduced to "crypto." That misses the point. Blockchain is not just about speculative tokens or digital coins, it is a much more radical rethinking of how trust is built and maintained. Tapscott's phrase, "the trust protocol," captures this well: a distributed system where cryptographic proof takes the place of institutional middlemen. And this is no longer a thought experiment. By 2025, global spending on blockchain solutions is projected to exceed $23 billion, with estimates of over $3 trillion in value creation by 2030[1]. Even today, blockchain is already reshaping areas far removed from currency; supply chains, identity verification, public records, healthcare. In these spaces, Indian firms like Antier Solutions and Tech Mahindra have been among the early movers. As Nakamoto wrote when launching Bitcoin, "The root problem with conventional currency is all the trust that's required to make it work." That critique has only grown sharper in a world where digital systems constantly mediate value and authority. But blockchain doesn't just disrupt industries. It also destabilizes certain infrastructures for legalistic governance. Blockchain challenges law's idea toward a sovereign, centralized command, De Filippi as well as Wright argue. Tenets regarding jurisdiction, liability, also enforcement exist uneasily with its distributed, unchangeable, plus anonymous infrastructure. Difficult questions arise because law must keep up in a global world setting rules through code instead of courts or legislatures. Academics such as Lessig and Cohen have conceptualized a novel form of pluralism as rule via code, which circumvents or supplants established legal systems.

[1] Blockchain to generate $3.1 trillion new business value by 2030: Gartner, TechCircle (Nov. 14, 2019), https://www.techcircle.in/2019/11/14/blockchain-to-generate-3-1-trillion-new-business-value-by-2030-gartner/. (last visited July 17, 2025)

This conversion situates India in a notably detailed location. The country, exhibiting a median age of 28[2] as well as over 850 million internet users, can take advantage of decentralized technologies. Aadhaar constitutes the world's largest biometric identity system[3], and UPI presently handles over 10 billion monthly transactions[4]. The present architecture furnishes suitable basis for blockchain resolutions extensively. Indeed, the figures are self-explanatory; over 100 blockchain ventures originated recently, and cryptocurrency users embraced it increasing from approximately 3 million to beyond 20 million between 2023 and 2025, notably in smaller municipalities. The established governance tactic remains quite inconsistent. Thus far, it has been inconsistent at its finest. Nilekani's phrase, "policy schizophrenia," elucidates it ideally. One instance of reactive, ad hoc policymaking is the RBI's 2018 ban upon banking services for crypto businesses later struck down by the Supreme Court in IAMAI v. RBI (2020)[5] as disproportionate and unsupported. The 30% tax[6] on digital assets, announced soon after, only deepened uncertainty. Meanwhile, incidents like the 2024 WazirX hack, which affected some 15 million investors, have exposed serious gaps in consumer protection and oversight.

What's at stake here is not just whether India "embraces" blockchain, but whether it can craft a regulatory and institutional response that matches the scale and nature of the change — one that sees the technology for what it really is: not just a new asset class, but a new way of organizing trust.

UNDERSTANDING BLOCKCHAIN

Blockchain at its most basic is a kind of distributed ledger technology. It allows data to be recorded, also synchronized, also validated across a network of independent nodes. Unlike a traditional database, which depends upon some central authority to maintain as well as verify records, a blockchain removes the center entirely. It uses consensus mechanisms, Proof of Work, or else Proof of Stake, to preserve integrity. Not perfect, but enough that tampering becomes impractical. Vitalik Buterin remarks this quite plainly: blockchains "automate away

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[2] United Nations, *World Population Prospects 2022*, U.N. Dep't of Econ. & Soc. Affs., https://population.un.org/wpp/ (last visited July 17, 2025)

[3] Unique Identification Authority of India (UIDAI), *Aadhaar Dashboard*, https://uidai.gov.in/aadhaar_dashboard/ (last visited July 16, 2025)

[4] National Payments Corporation of India (NPCI), *UPI Monthly Product Statistics*, https://www.npci.org.in/what-we-do/upi/product-statistics (last visited July 17, 2025)

[5] Internet and Mobile Association of India v. Reserve Bank of India, (2020) 10 SCC 274 (India).

[6] The Finance Act, 2022, No. 6, Acts of Parliament, 2022 (India).

the center," removing intermediaries and placing trust elsewhere, into the code, into the network.

KEY TECHNICAL TRAITS AND LEGAL TENSIONS

The design of blockchain rests on certain interlocking features, each carrying legal as well as societal friction points.

- **Decentralization:** Data and authority are distributed. This avoids single points of failure. Also it makes censorship, or manipulation by one party, much harder. This is valuable especially where intermediaries are inefficient, corrupt, or simply expensive. But at the same time decentralization complicates things because responsibility becomes harder to pinpoint.
- **Immutability:** Once a block enters the chain, it stays. Each block links to prior blocks cryptographically. To change one later would require collusion by much of the network. In theory possible, in practice nearly impossible. This makes blockchain records reliable as evidence. Yet it conflicts with certain norms- for example, the idea in GDPR of a "right to be forgotten," which presumes erasure.
- **Transparency and Auditability:** On public chains, such as Bitcoin and Ethereum, anyone can see the full history. This radical transparency increases accountability. But it also risks privacy because sensitive information, once written, may stay permanently visible.
- **Programmability via Smart Contracts:** Smart contracts create a new legal form entirely. Nick Szabo described these as "a set of promises, specified in digital form." They cut out courts, sometimes entirely. But their use raises familiar doctrinal problems. Consent. Capacity. What happens when code is wrong or exploited? Those questions still lack clear answers.

LEGAL AND REGULATORY LANDSCAPE IN INDIA

India's response to blockchain and cryptocurrency has been, to put it mildly, muddled. No coherent policy exists, no guiding principles to speak of; only a patchwork of bans, taxes, and circulars that sometimes contradict each other outright. In a way, that's not entirely surprising: decentralized technology unsettles the way regulators have always thought about control. But the costs of this drift keep adding up. In 2018, the Reserve Bank of India issued a sweeping ban on banks servicing crypto businesses (Circular RBI/2017-18/154)[7]. The justification was

[7] Reserve Bank of India, Prohibition on Dealing in Virtual Currencies (VCs), RBI/2017-18/154 DBR.No.BP.BC.104/08.13.102/2017-18 (Apr. 6, 2018), https://www.rbi.org.in/commonman/english/scripts/Notification.aspx?Id=2632.

thin, claims of threats to financial stability and money laundering risks, never really substantiated. The Supreme Court overturned the ban in *IAMAI v. RBI* (2020), calling it disproportionate. That opened the door again for crypto firms but did nothing to solve the deeper problem. To this day, no law defines what crypto actually is, how it should be classified, or who is responsible for overseeing it. Courts can strike down bad policy, but they cannot write it.

Since then, the government has tried to regulate indirectly mostly through taxation. In 2022 it imposed a 30% tax on crypto gains, plus a 1% TDS on transactions above ₹10,000. These amendments (Sections 115BBH and 194S of the Income Tax Act) treat crypto as taxable property, but stop short of saying whether it's a commodity, a security, or something else entirely. Investor protections remain non-existent. Predictably, much of the market activity has simply gone offshore, or underground, lowering revenues and increasing risks.

In 2023, crypto services were brought under India's anti-money laundering and counter-terrorism financing rules. On paper this aligns with FATF standards. In practice, though, it's hard to see how pseudonymous, decentralized networks can really be monitored. A different contradiction comes from the Digital Personal Data Protection Act, 2023. That law gives individuals the right to erase or correct their data something that immutable blockchains by design cannot accommodate. Other jurisdictions have at least begun experimenting with solutions like zero-knowledge proofs and off-chain storage. India, so far, has proposed nothing of the sort. Perhaps the most glaring problem is what hasn't been done. The 2019 bill that proposed an outright ban was shelved, but nothing meaningful has replaced it. The IT Act remains silent on smart contracts and DAOs. SEBI has never clarified whether certain tokens qualify as securities. Instead, agencies seem content to wait or worse, to take contradictory stances and leave the gaps for others to fill. That kind of approach cannot endure. India's demographic and technological advantages are obvious enough, but without clear and deliberate regulation, the country risks falling behind just as others are moving forward. The longer lawmakers hesitate, the harder it will become to catch up.

KEY LEGAL CHALLENGES IN BLOCKCHAIN ADOPTION

India's legal system is still struggling to keep pace with the strangeness of blockchain. A few piecemeal rules have appeared here and there but the bigger picture remains blurry. The laws we have were written for centralized, paper-based institutions and they simply don't fit something decentralized, permanent, and often anonymous. Blockchain's borderless character collides with one of Indian law's core assumptions: that jurisdiction comes from geography. The Code of Civil Procedure, 1908 and rulings like *Google India (P) Ltd. v. Visaka Industries*

(2020) both depend on the idea of identifiable parties tied to a specific place. But blockchain transactions are validated by nodes scattered around the globe, which makes it hard, sometimes impossible, to identify a proper forum for disputes. Indian law offers no guidance here. There are no statutes, no judgments, no conflict-of-laws rules designed for distributed networks. Courts have occasionally asserted jurisdiction in digital cases, but enforcing those decisions against pseudonymous actors remains elusive. Without some kind of international agreement, this uncertainty is only going to grow.

Smart contracts pose a different but equally thorny challenge. On the surface they can tick the boxes of the Indian Contract Act, 1872; offer, acceptance, consideration; all written into code. But that is superficial. Consent, capacity, intention to be bound all remain untested in this context. There is no statutory clarity and no authoritative judicial interpretation. As NITI Aayog warned in its *Blockchain: The India Strategy* report, the lack of legislative recognition leaves anyone deploying smart contracts exposed to unnecessary legal risk. Other tensions arise at the intersection of blockchain and adjacent regulatory regimes. Take data protection. Blockchain's immutability is hard to square with the *Digital Personal Data Protection Act, 2023*, which assumes that data can be corrected or erased when requested. Public blockchains can also expose personal data in ways that violate principles like minimization and purpose limitation. The Act does not include any exceptions for decentralized systems, which leaves developers and operators in a difficult position.

Consumer protection is another weak spot. Ponzi schemes, fraudulent tokens and unregistered ICOs have flourished in the absence of a targeted regulatory framework. Retail investors are left vulnerable despite occasional enforcement by the Enforcement Directorate under the *Prevention of Money Laundering Act, 2002*.

Finally, the pseudonymity that defines blockchain makes anti-money laundering and know-your-customer compliance under the PMLA extremely challenging. The Ministry of Finance in 2023 extended AML and KYC obligations to crypto service providers, which on paper aligns with FATF standards. In practice, however, enforcement remains inconsistent especially when users bypass centralized platforms altogether. The recent fines against Binance and Bybit demonstrate both the government's intent to crack down and the persistent difficulty of policing decentralized systems.

LESSONS FOR INDIA

India stands at a critical juncture in its digital future. The rise of blockchain technology has exposed a familiar tension: how to foster innovation without undermining stability. The experience of other nations is instructive here. Where rules are vague, markets exploit

loopholes. Where agencies fail to coordinate, enforcement becomes uneven. And where regulators tie standards too closely to specific technologies, innovation moves faster than the law can follow. International bodies have sounded the alarm. Both the Financial Stability Board and IOSCO warn that inconsistent national approaches invite regulatory arbitrage and erode trust in markets. That is not a risk India can ignore.

But imitation is not enough. Simply copying another country's rules would miss the point and the opportunity. India needs a framework that draws on global best practices but is anchored in its own economic priorities and institutional realities. Regulatory coherence is not just a bureaucratic ideal. It is the price of admission to the next phase of global economic competition. India should not hesitate to pay it.

POLICY RECOMMENDATIONS

India is at a turning point. The debate over blockchain has moved past questioning its relevance. The real challenge now is finding a way to regulate it with care and foresight. Lurching between heavy-handed control and complete inaction serves no one. What India needs is a framework rooted in principle but flexible enough to foster innovation while safeguarding the public interest. The recommendations that follow build on international experience, adapted to India's unique institutional and economic context.

1. Enact a Purpose-Built, Technology-Neutral Blockchain Law

India's current patchwork of statutes was never designed with blockchain in mind. Rather than papering over gaps with ad hoc amendments, Parliament should enact a dedicated *Blockchain and Digital Assets Act*. At minimum, it should:

- Define key terms, tokens, smart contracts, DAOs, to remove ambiguity.
- Draw clear risk-based boundaries between high-impact systems and low-risk experiments.
- Bake in flexibility, neutrality, and proportionality, so that regulation keeps pace as the technology evolves.

2. Create an Independent Multi-Stakeholder Regulator

Right now, responsibility is scattered across RBI, SEBI, the IT Ministry, and others which only leads to confusion. A single, independent *Blockchain Regulatory Authority* should be established, with seats for legal, technical, industry, and civil society representatives. Its remit would include:

- Licensing and oversight.
- Managing innovation sandboxes.
- Serving as a one-stop forum for guidance and rulemaking.

3. Expand Sandboxes into Real-World Pilots

India's existing regulatory sandboxes are too cautious to truly test blockchain's potential. The rapid growth of blockchain in fintech—from USD 101.39 million in 2024 to USD 2,008.85 million projected by 2033 at a 39.35% CAGR—signals both appetite and capacity for bold experimentation. They should be upgraded into *Regulatory Sandboxes 2.0*, which allow live pilots of applications such as decentralized finance, tokenized assets, and digital ID systems, under defined legal safe harbours. These pilots should include:

- Mandatory impact assessments.
- Sunset clauses to avoid regulatory drift.
- Rapid scaling for models that prove viable.

4. Give Legal Standing to Smart Contracts and DAOs

Smart contracts are already being deployed in India, yet their enforceability remains uncertain. India's startup ecosystem hosts over 30,000 blockchain innovators and practitioners, but the legal ambiguity around DAOs and smart contracts risks stifling this community and preventing India from attracting the kind of investment seen in progressive jurisdictions like Malta and Wyoming. They should be explicitly recognized under the Indian Contract Act, provided they meet its substantive requirements. At the same time, India should consider granting limited legal personality to DAOs, with rules for governance and liability, drawing on early experiments in places like Wyoming and Switzerland.

5. Embed Privacy by Design and Set Interoperability Standards

Blockchain's permanence can clash with privacy rights. India should require privacy-friendly technical standards including zero-knowledge proofs, selective disclosure, and off-chain storage for personal data. To ensure compatibility with India's broader digital infrastructure, national interoperability standards should also be set and enforced.

6. Establish a Specialized Dispute Resolution Mechanism

Code-based, cross-border transactions pose novel legal questions. A dedicated *Blockchain Dispute Resolution and Arbitration Centre* should be created to handle these efficiently, combining technical expertise with modern online arbitration processes. This would position India as a venue of choice for resolving blockchain-related disputes.

7. Shape, Rather than Follow, Global Standards

India can't afford to sit back and simply adjust to rules written elsewhere. If anything, the last few years have shown that India has the clout and the opportunity to set the tone for how blockchain is regulated worldwide. As G20 president in 2023, it didn't just host the conversation on digital assets; it shaped it, showing what leadership could look like in this

space. The stakes are massive: estimates put blockchain's potential contribution to India's economy at over $1 trillion in the next few years, closer to $2 trillion when factoring in AI-driven growth. That kind of upside won't wait. India should stay at the table and at the front by taking a strong voice in G20, FATF, and IOSCO discussions, while experimenting with cross-border regulatory sandboxes alongside partners like Singapore and the EU. Setting the agenda now means we won't have to live with someone else's later.

8. Invest in Literacy and Institutional Capacity

Rules are only as good as the people who write and enforce them. Right now, blockchain and crypto jobs in India have exploded growing more than eightfold between 2020 and 2022 and already account for nearly 70% of new tech roles. Another 300,000 fintech jobs are expected this year alone. But if the people running our regulatory and legal systems can't keep pace, the whole system risks clogging up. Some efforts are already underway like NITI Aayog's blockchain curriculum, now being piloted in thousands of schools but much more is needed, and fast. India should launch a national literacy campaign on blockchain and digital assets, aimed not just at the public but at regulators, judges, police, and bureaucrats. At the same time, universities and think tanks need support to develop real, interdisciplinary programs that sit at the intersection of law, technology, and governance because that's where the future will be decided.

CONCLUSION

India's regulatory approach to blockchain has been tentative at best, confused at worst. For years, policy has lurched between outright bans and grudging acceptance, never quite committing to a vision. The RBI's sweeping 2018 ban was overturned, the courts called it overreach, and yet what followed was no better, a punitive tax regime that managed to alienate innovators without meaningfully protecting consumers. The result? An ecosystem bleeding talent, capital, and credibility to countries willing to take blockchain seriously.

That drift can't continue. The stakes are too high now. Europe has codified a coherent regulatory playbook with MiCA. Singapore has managed to strike a rare balance that's pragmatic, flexible, yet firm. India, meanwhile, risks becoming the cautionary tale: a country with the talent to lead, but the indecision to watch others do it first. What's needed isn't more tinkering around the edges. It's a full reset. The hard questions have to be faced head-on. What does a token represent in Indian law? When is a DAO just a codebase, and when is it a legal entity? How do we reconcile a blockchain's permanence with an individual's right to privacy? And who, which institution, with what authority is going to answer these questions without

tripping over others? If policymakers won't address these directly, the courts, the market, or worse, other countries will do it for them.