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BLOCKCHAIN TECHNOLOGY AND LAW

~Sumeghna Paul

INTRODUCTION

Every transaction, agreement or transfer of value, that has ever taken place and has been consequently recorded ultimately depends on one factual question: can the record of that transaction be trusted? Traditionally, that answer mainly depended on central authorities or intermediaries. Blockchain and the technology behind it, seeks to change this system.

This brings us to the core premise of ‘what is blockchain?’

¹Blockchain is a shared, unchangeable (immutable), digital ledger that enables the recording of transactions and helps in the tracking of assets. This, contrary to the traditional methods, serves as a single source of truth for the transactions recorded.

²While the mechanism of blockchain first emerged for finance, its applications have extended far beyond its narrow scope and are now used for various other fields, like business, healthcare, entertainment, and so on and so forth.

As the blockchain technology continues to grow further across industries, its implications increasingly extend beyond technological and financial fields. Its use in areas such as contracts, financial data and transactions, personal data, etc, brings it directly under the supervision of established legal frameworks and regulations. The intersection point between the two absolutes of decentralized blockchain technology and the traditionally centralized legal system contains a number of novel legal questions.

¹ IBM, What Is Blockchain?, IBM (2021), <https://www.ibm.com/think/topics/blockchain>.

² TDK, Blockchain Reimagined: Impacting Industries Beyond Cryptocurrency, TDK (2025), <https://www.tdk.com/en/tech-mag/past-present-future-tech/impact-of-blockchain-technology-on-busines>

This article mainly explores the legal implications of blockchain technology with a particular focus on the Indian legal and regulatory framework. Rather than focusing entirely on the technological part of blockchain, the discussion mainly focuses on the extent to which legal principles can coordinate with rising blockchain applications throughout different sectors and the regulatory challenges that may arise as the technology continues to improve.

UNDERSTANDING BLOCKCHAIN TECHNOLOGY

To understand the legal question surrounding blockchain technology, we first have to understand what the technology actually involves.

Blockchain technology holds data securely by linking ‘blocks’ together. Each transaction is recorded as a ‘block’ of data on the blockchain. These blocks track the movements of assets, whether tangible or intangible. It also includes critical information as well as the exact timestamp as to when the transaction took place.

Each block is then connected to the one before it and the one after it creating a secure chain. This chain is created through cryptographic hashes. ³Cryptographic hashes are mathematical algorithms that transform the input data into a fixed length sequence of characters referred to as hash value. This system makes it nearly impossible to alter any block before changing the subsequent block thus ensuring the integrity of the process.

⁴With every new block, the blockchain becomes more secure, making it almost impossible to alter the past information. This immutability provides a transparent digital ledger that can be trusted by all members of the network alike.

WHY DOES BLOCKCHAIN CREATE LEGAL CHALLENGES?

Blockchain creates legal challenges because of the very features that make it unique, immutability and decentralized technology which directly clashes with traditional laws built for centralized authorities.

³ GeeksforGeeks, Cryptography Hash Functions (July 23, 2025), <https://www.geeksforgeeks.org/dsa/cryptography-hash-functions/>

⁴ IBM, *supra* note 1.

⁵Firstly, decentralization makes it difficult to ascertain who is to be held accountable, or bears legal responsibility. In a regular transaction, responsibility can be traced back to the participants involved in the transaction, which could be individuals or subsequent intermediaries or institutions. But in blockchain technology, the validation and maintenance of records is distributed throughout multiple participants, thus making the process of enforcing regulatory frameworks and demanding liability and accountability much more complex and difficult.

Secondly, immutability creates a different set of concerns. Once information is recorded on a blockchain, altering or removing it can be difficult without disrupting the mechanism of the ledger. While this provides a certainty regarding the integrity of records, it can conflict with the legal frameworks that require certain information to be altered or changed in the course of time.

These characteristics also create problems regarding the scope of jurisdiction and data protection, particularly where the blockchain transaction involves participants situated across borders.

LEGAL STATUS OF BLOCKCHAIN AND CRYPTOCURRENCIES IN INDIA

⁶Most jurisdictions have yet to enact laws governing blockchain and cryptocurrency, thus its legal validity still remains a widely explored question. The legal position of blockchain and cryptocurrency in India must be distinguished. Blockchain, being a technology, does not face much restriction and is widely governed on the basis of its applications. Cryptocurrency, however, falls within the broader framework of Virtual Digital Assets (VDAs) under the Indian tax laws. ⁷Section 2 (47A) of the Income Tax Act, 1961, defines Virtual Digital Assets as any information, code or token that can be generated through cryptographic means and provides a digital representation of value.

India has consequently developed a system of taxes for cryptocurrencies and VDAs. Section 115BBH⁸ of the Income Tax Act, 1961 deals with the taxing system on income from digital assets. It specifies that income from the transfer of a VDA is taxable at 30% and is subject to

⁵ OECD/KDI (2021), *Case Studies on the Regulatory Challenges Raised by Innovation and the Regulatory Responses*, OECD Publishing, Paris, <https://doi.org/10.1787/8fa190b5-en>.

⁶ Freeman Law, India and Cryptocurrency, FREEMAN LAW, <https://freemanlaw.com/cryptocurrency/india/>

⁷ Income Tax Act, 1961, § 2(47A) (India), Indian Kanoon, <https://indiankanoon.org/doc/545792/>

⁸ Income-tax Act, 1961, § 115BBH

statutory conditions. Section 194S⁹ of the same act deals with payments made on the transfer of virtual digital assets and requires a 1% Tax Deducted on Source (TDS) from the same.

¹⁰The regulatory framework extends beyond taxation. In March 2023, specified activities involving VDAs were brought within the regulating framework, under the Prevention of Money-Laundering Act, 2002, including exchanges between VDAs and fiat currencies, transfers and custody-related services. VDA service providers covered by the framework are required to comply with the applicable AML/CFT obligations and register with FIU-IND as reporting entities.

BLOCKCHAIN AND DATA PROTECTION

Blockchain technology presents a particular challenge to data protection law, because of the underlying tension between its fundamental characteristic and existing data protections laws and requirements. Blockchain provides an unchangeable, tamper resistance record, whereas data protection frameworks might require personal information to be modified or altered.

This tension becomes particularly relevant under India's Digital Personal Data Protection Act, 2023 (DPDP Act)¹¹. The act provides individuals with rights concerning data protection, including the right to correction and removal of data, relevant to the conditions of the Act. However in cases where personal data is directly stored in blockchain, it becomes technically difficult to remove or alter information without it affecting the overall integrity of the ledger. This thus creates uncertainty, regarding how such rights can be exercised, in systems where the blockchain technology is applied.

¹²A further difficulty arises due to the decentralized nature of blockchain technology. The DPDP Act places obligations on identifiable data fiduciaries in relation to the processing of personal data. A Data fiduciary is any person who alone or in conjunction with other persons determines the purpose and means of processing personal data.

⁹ Income-tax Act, 1961, § 194S

¹⁰ Financial Intelligence Unit- India (FIU-IND) issues notices for non-compliance to 15 Virtual Digital Assets Service providers (VDA SPs) under Section 13 of the Prevention of Money Laundering Act (PML) Act, 2002

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¹¹ Digital Personal Data Protection Act, 2023, § 12 (India).

¹² Digital Personal Data Protection Act, 2023, §§ 2(i), 8 (India)

The conflict does lie necessarily lie between blockchain technology and data portection rights as a whole, but between certain implementations and applications of blockchain technology. One possible solution could be, instead of putting identifiable personal data on- chain, it could be stored off-chain while only retaining necessary verification information on the blockchain.

JURISDICTION, CROSS-BORDER TRANSACTIONS, AND THE WAY FORWARD

The decentralized and borderless nature of blockchain technology creates multiple difficulties regarding the scope of jurisdiction and applicable law. A single transaction may involve multiple parties, validators and digital assets situated across multiple jurisdictions, thus making it difficult to ascertain which country's laws governs the transactions and which courts have jurisdiction over the disputes. Traditional rules of territorial jurisdiction may therefore, be difficult to apply on blockchain- based transactions.

These challenges are particularly significant where disputes involve smart contracts or digital assets, transferred across borders. This is because, identifying the location of the transaction may itself prove to be a difficult process. Differences between the regulatory framework of various countries can create further uncertainty for businesses and user operating internationally.

Addressing these challenges, require greater international regulatory cooperation and clearer rules concerning jurisdiction, liability and cross-border enforcement. At the national or domestic level, India could adopt technology neutral regulations that address the risks associated with the innovation of blockchain technology. Privacy-conscious blockchain designs and clearer allocation of legal responsibilities could further help reconcile decentralisation with regulatory accountability.

CONCLUSION

Blockchain technology has moved beyond cryptocurrency to become a significant technological system with applications across multiple sectors. Its decentralized and immutable nature, however, challenges legal frameworks built around controllable records. India has begun addressing aspects of blockchain technology, through taxation, anti money laundering and data protection frameworks. But significant questions regarding responsibility, accountability, privacy and cross-border enforcement remain. The future of

blockchain technology regulation therefore lies not necessarily in restricting the technology, but in developing a legal framework capable of accommodating its distinctive characteristics while preserving accountability and individual rights.