



AN ANALYTICAL STUDY ON- BLOCKCHAIN TECHNOLOGY AND THE PROSPECTIVE REVOLUTION IN FINANCIAL SERVICES

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ABSTRACT

Blockchain technology has revolutionized various sectors and is considered the catalyst for a new era. Its widespread popularity and applications have disrupted existing systems, particularly in the financial industry. This technology is poised to shape the future of finance, impacting an increasing number of financial services. As financial firms strive to adapt to these changes and meet growing demands, they are incorporating new technologies to enhance competitiveness globally. Customers seek simplicity, convenience, efficiency, and speed in financial services. Blockchain is expected to be a game-changing innovation that will profoundly influence the financial sector. This suggests that financial institutions are likely to benefit from embracing blockchain technology. This article critically examines the use of blockchain in Indian financial services and its regulatory concerns. Blockchain technology provides secure and reliable transactions, but the issue of privacy has sparked intense debate. Given the circumstances, it is conceivable for the aforementioned technology to dominate the financial services sector in a short amount of time if appropriate rules are created, implemented, and codified for the betterment of the blockchain technology.

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CONCEPT OF BLOCKCHAIN TECHNOLOGY:

The term “cryptocurrency” has gained popularity in business and academia, with Bitcoin being one of the most well-known examples, boasting a market worth exceeding \$10 billion in 2016. Bitcoin's underlying technology is blockchain, introduced in 2008 and operationalized in 2009. Blockchain enables direct transactions without third-party involvement. It utilizes an organized, decentralized, and immutable database, allowing transaction recording and sharing in a network. Each block within the blockchain contains essential transaction information.

Blockchain technology, created by the pseudonymous Satoshi Nakamoto, enabled the development of Bitcoin, the first decentralized and trustless payment system. It offers decentralization and immutability as its key features. Records are distributed among participants, eliminating the need for intermediaries and facilitating peer-to-peer communication. This enhances efficiency and reduces costs by removing the involvement of third parties. Transactions are irreversible once recorded, ensuring a high level of security and confidence. Bitcoin's distributed ledger system allows users to view transaction history without a centralized authority. Blockchain, with its characteristics of decentralization, persistence, anonymity, and auditability, offers a secure and tamper-resistant distributed database. By eliminating the need for banks and middlemen, blockchain has the potential to revolutionize various financial activities such as digital asset exchange, remittance, and online payments, leading to cost reduction and increased efficiency.

The core of the authentication process is advanced cryptography, which is typically viewed as secure in and of itself. As a result, players are no longer dependent on a third party to guarantee their legitimacy and transparency. To ensure transaction consistency and transparency, the blockchain use mathematics rather than trust. The implementation of blockchain technology has an impact on the type of transaction that takes place. Each transaction in Bitcoin, for instance, entails the exchange of a certain amount of the cryptocurrency amongst users, and each transaction is documented on the blockchain. Transaction cannot be tampered once it is packed into the blockchain. The data stored in the blockchain is immutable, which means it cannot be altered. Blockchain technology can help businesses that need a high degree of dependability and transparency use it to win over customers. Additionally, the blockchain's distributed architecture can shield against any single point of failure. Smart contracts can also be used, with the terms of the contract being automatically carried out by miners upon distribution onto the blockchain.¹

¹ Hong- Ning Dai et al, “An Overview of Blockchain Technology: Architecture, Consensus, and Future Trends”. 2017 IEEE 6th International Congress on Big Data Oct 6, 2017 DOI:[10.1109/BigDataCongress.2017.85](https://doi.org/10.1109/BigDataCongress.2017.85)



The idea of blockchain was first presented in the 2008 Bitcoin white paper, allowing the individuals to transact and spend their money without the assistance of conventional financial institutions. In 2014, Ethereum a more recent and sophisticated version of blockchain technology, was released. It enables programmers to build and run smart contracts over a distributed network. Developers and organizations can create a variety of financial applications using smart contracts, including decentralized financing (DeFi), crowdfunding platforms, decentralized exchanges, and safe data archiving systems. To make transactions easier and financial operations more safe and transparent, these applications integrate cryptocurrencies and other digital tokens.²

Blockchain's decentralized nature allows all parties to access records, promoting peer-to-peer communication and eliminating middlemen. This streamlines the process, making it faster and more cost-effective. Immutability is another important feature, ensuring that transactions cannot be altered once recorded. If modifications are needed, new transactions are created and updated across the network. Validation by additional computers and the inability to modify verified transactions enhance confidence and security.

GLOBAL ISSUES CONCERNING BLOCKCHAIN IN INDIA:

Blockchain technology and cryptocurrencies have gained global attention in recent years, including in India. The country has seen the emergence of blockchain-based enterprises and cryptocurrency exchanges. However, the regulatory environment in India remains uncertain as the Reserve Bank of India (RBI) and the government approach these technologies cautiously. Similar to global concerns, India also faces the need for regulations to protect investors, prevent illegal activities such as money laundering and terrorism financing, and address environmental concerns related to cryptocurrency mining.

Exploring the legal implications of blockchain technology is challenging due to the lack of existing guidance. Unlike Bitcoin, which has been extensively studied, understanding the legal ramifications of blockchain across various use cases is more complex. This is because blockchain technology has numerous applications beyond Bitcoin, making it harder to address its legal issues in a generalized manner. The following are some concerns with blockchain technology:

i. Pseudonymity and Legal Enforcement:

Pseudonymity and legal enforcement pose significant challenges in the context of blockchain technology. The association of Bitcoin with illicit activities on the dark web adds to concerns

² Seyed Mojtaba Hosseini Bamakan, "Patents and intellectual property assets as non-fungible tokens; key technologies and challenges", *Scientific Reports* volume 12, Article number: 2178 (2022), 9 Feb, 2022.



about accountability and compliance with regulatory requirements. The use of pseudonymous or anonymous identities on the blockchain complicates efforts to hold participants accountable and enforce statutory, tax, and contractual obligations. Reporting obligations such as KYC, anti-money laundering, and anti-terrorist financing regulations become difficult to implement in blockchain transactions. One possible solution is for users to relinquish their anonymity or pseudonymity for business transactions on the blockchain, which would require legislative amendments such as those in the IT Act. Technical options already exist to support this change. Private or permissioned blockchains, in contrast to public or permissionless blockchains like Bitcoin, offer control over network access and interactions, which can be leveraged in enterprise blockchain solutions.

ii. Privacy and Cyber-security:

Privacy:

Blockchain technology raises new concerns regarding privacy laws and regulations. While the decentralized nature of blockchain itself does not inherently violate privacy, the permanent and unchangeable nature of added information poses challenges. Existing privacy regulations, such as the Indian IT Act, do not specifically address privacy protections for blockchain users, as they mainly focus on personal data collection by websites or apps. Consequently, the standard Internet privacy rights may not apply to the blockchain, which lacks a centralized entity gathering and managing user information. The concept of privacy on the blockchain contradicts the definition stated in section 43A of the IT Act, as there is no single "body corporate" responsible for data collection and resource management. Instead, blockchain operates on a decentralized control system where all users have access to the same information.

Cyber-security:

Data breaches are being announced every day, and several hacks, including the Coin Check hack of over USD 500 million worth of cryptoassets,³ show that the blockchain technology implementation is not always successful (even though the underlying technology is widely acknowledged to be robust and secure). Private keys are a clear target and frequently a "single point of failure" because, for example, participants' private keys can unlock their complete holdings. With Bitcoin, this danger has already manifested on numerous occasions. Due to the widespread adoption of blockchain technology online, laws like the Information Technology Act and the Information Technology (Reasonable Security Practices and

³ Ivan Novikov "why are crypto exchanges hacked so often." Sept 17, 2018
<https://www.forbes.com/sites/forbestechcouncil/2018/09/17/why-are-crypto-exchanges-are-hacked-so-often/?sh=5e26f7b73421>



Procedures and Sensitive Personal Data or Information) Rules of 2011 are pertinent to and applicable to blockchain-related activities. However, due to the lack of a controlling “body corporate” to assign responsibility for cybersecurity in the blockchain, these requirements do not readily fit with its inherent characteristics. Operators of Blockchains will be subject to the Rules' obligations for cybersecurity wherever they exist. This does not, however, guarantee safety because the system is decentralized and because there are not always any centralized “operators” (as with Bitcoin).

Furthermore, because they were not designed with the blockchain’s decentralized structure in mind, current data protection may not be adequate for it.

iii. Jurisdictional Issues:

Jurisdictional concerns pose challenges in the context of blockchain and cryptocurrency due to the decentralized and global nature of these networks. Conventional legal frameworks relying on centralized agencies and territorial boundaries struggle to determine applicable laws. Conflicts arising from blockchain transactions require consideration of factors such as the parties' location, server hosting locations, and their intention to interact with users in specific jurisdictions. Identifying the applicable jurisdiction's laws can be complex and may lead to disagreements among parties.

Enforcing court rulings and judgments in the context of blockchain transactions can be challenging due to the irreversible and pseudonymous nature of these transactions. Identifying and enforcing decisions against parties based in other jurisdictions may be difficult, potentially causing difficulties for individuals and companies affected by fraudulent or criminal activities on the blockchain.

LEGAL BACKING OF CRYPTO CURRENCIES:

The internet has blurred national borders, challenging the clarity between technology and regulatory environments. It is now possible to conduct legal transactions across countries with a simple click. However, the applicability and enforcement of laws in these cross-border situations remain unclear, as legal systems are based on national borders. Understanding which laws apply and which governments have jurisdiction is crucial, particularly in cases where legal acts are committed. The true extent of the law’s applicability is still limited.

Cryptocurrencies exist in a complex regulatory landscape with significant regional variations. They are decentralized digital money not backed by a centralized institution. The legal status of cryptocurrencies varies widely between nations, ranging from acceptance and regulatory frameworks to outright bans or lack of clear guidelines. The legal status is subject to ongoing discussions and debates. Some countries consider cryptocurrencies as legal tender and subject



them to taxation and regulations, while others impose restrictions or outright prohibition. The legal status of cryptocurrencies can greatly impact their usage, adoption, as well as the activities of investors and companies in the cryptocurrency industry.

Determining the applicable laws for Blockchain transactions is complex due to the decentralized nature of the technology. Different legal sectors establish their own requirements for applicability. It is possible that a Blockchain transaction may be governed by the civil law of a specific state, and taxes may be imposed by the relevant authorities. The applicability of laws can vary depending on the situation and the jurisdictions involved. At the transaction level, it is usually evident which laws apply when parties within the same jurisdiction engage in a Blockchain transaction. However, in transactions involving parties from different countries, national private law must determine the applicable civil law.

Significant improvements have been made in India's FinTech sector during the past few years. The finance minister post his Budget Speech earlier in 2018 when he states that "*the government will explore the use of blockchain technology proactively for ushering in digital economy*".⁴ This one was viewed as a positive step for the Indian FinTech industry because blockchain technology has the power to fundamentally alter how financial transactions are carried out, especially in terms of security, transparency, and efficiency. The Reserve Bank of India (RBI) has formed an inter-regulatory Working Group to address regulatory matters concerning FinTech and digital banking in India. Reserve Bank of India (RBI) is exploring applying Blockchain technology in the banking domain.

Although blockchain technology itself has not caused major regulatory controversy, its uses, notably in the financial sector, have sparked a number of legal and regulatory concerns. Blockchain-based applications, for instance, might deal with delicate personal information or financial transactions, which could violate regulations governing data privacy, consumer protection, and anti-money laundering. Furthermore, the enforcement and validity of contracts can be questioned when using blockchain-based smart contracts. The usage of cryptocurrencies, which frequently rely on blockchain technology, has prompted debate over their legal standing and regulation as a medium of exchange or investments. Led by the U.K., many countries including Australia, the U.S., Hong Kong, Malaysia, Singapore, Switzerland, Thailand, and United Arab Emirates have implemented or are exploring the idea of 'regulatory sandboxes' for blockchain (and other types of) innovation.⁵ Regulatory sandboxes enable businesses to test out novel business ideas without worrying about potential regulatory repercussions, provided they adhere to predetermined standards for consumer protection. In India, the RBI's Report of the Working Group of FinTech and Digital Banking also seems to

⁴ <https://www.indiabudget.gov.in/> (last visited: 18th March, 11:37 pm)

⁵ <https://www.worldbank.org/en/topic/fintech/brief/key-data-from-regulatory-sandboxes-across-the-globe> (last visited: 18th March, 11:56 pm)



indicate that the RBI will consider regulatory sandboxes for India.⁶ Many nations have implemented regulatory sandboxes to aid in the creation of blockchain based applications in a variety of sectors, including energy, healthcare, and financial services. On a separate note, the governments of Canada, China, Japan, India, Netherlands, the U.K., and Sweden have all been reported to be exploring the issuance of digital versions of fiat currency on the blockchain.⁷ The deployment of blockchain technology in regular financial transactions will be made possible by government authorization. There are currently no laws or regulations in India that specifically address blockchain technology. However, a number of governmental organizations, including the Securities and Exchange Board of India (SEBI), the ministry of Electronics and Information Technology, and the Reserve Bank of India, have offered some guidelines on the use and regulation of blockchain and its uses. In April 2017, an interdisciplinary committee was set up by the Ministry of Finance, to be chaired by the Special Secretary (Economic Affairs) and representatives from various Central government departments, including the Department of Revenue (CBDT), Ministry of Electronics and Information Technology, the RBI, NITI Aayog, and State Bank of India, to examine the regulation of virtual currencies.⁸ A FinTech Cooperation Agreement was signed between the Government of Andhra Pradesh and the Monetary Authority of Singapore in October 2016 to “promote innovation in financial services in their respective markets, explore joint innovation projects on technologies such as digital payments and blockchain, collaborate on the development of education programs/curricula on FinTech, and discuss emerging FinTech trends and exchange views on regulatory issues related to innovations in financial services.” In 2016, former Deputy Governor H. R. Khan had told reporters, “Blockchain is one thing that has come out of Bitcoin which provides a lot of flexibility in terms of financial transactions. So, we need to study... how this blockchain technology can be used in financial transactions where the entire data systems move to some more levels.”⁹

In the February 2018 Budget Speech, the finance minister stated, “Distributed ledger system or the block chain technology allows organization of any chain of records or transactions without the need of intermediaries. The Government does not consider crypto-currencies legal tender or coin and will take all measures to eliminate use of these crypto-assets in financing illegitimate activities or as part of the payment system. The Government will explore use of block chain technology proactively for ushering in digital economy.”¹⁰ However, in April 2018, the RBI issued a circular which dealt a body blow to the crypto-asset

⁶ <https://rbi.org.in/scripts/PublicationReportDetails.aspx?ID=892> (last visited: 27th March, 11:59 pm)

⁷ https://rbi.org.in/Scripts/BS_PressReleaseDisplay.aspx?prid=43574 (last visited: 28th March, 12:05 am)

⁸ <https://pib.gov.in/newsite/printrelease.aspx?relid=160923> (last visited: 28th March, 12:07 am)

⁹ https://www.business-standard.com/article/pti-stories/rbi-to-study-blockchain-technology-to-curtail-paper-currency-116062401292_1.html (last visited: 28th March, 12:07 am)

¹⁰ <https://www.businesstoday.in/business/union-budget-2018-19/story/bitcoin-investors-jaitley-budget-speech-crypto-currencies-102328-2018-02-01> (last visited: 29th March, 01:33 pm)



and blockchain ecosystem in India.¹¹ The RBI issued a circular instructing regulated institutions, including banks, to cease doing business with individuals or organizations involved in virtual currencies (VC's) within three months. The circular cited concerns about cryptocurrency, such as money laundering and consumer protection, as the justification for the restriction. However, the circular was challenged in court, and the Supreme Court of India overturned the prohibition in March 2020, considering it disproportionate and arbitrary.

APPLICATION OF BLOCKCHAIN TECHNOLOGY IN FINANCIAL SERVICE SECTOR:

Bitcoin and other cryptocurrencies are powered by the blockchain technology, but this technology has many possible uses that go far beyond cryptocurrencies.

Transparency and security are enabled by blockchain technology, which eliminates the need for intermediaries like banks or other financial organizations to validate and process transactions. Due to this, major financial organizations have begun to use it to increase the effectiveness and security of their own transactions. Blockchain technology is being used by banks and other financial organizations, for instance, to settle securities and facilitate international payments. These institutions can speed up and save money on conventional payment and settlement processes while also enhancing the security and transparency of their transactions by utilizing blockchain.

In general, blockchain technology has the power to revolutionize a wide range of sectors. It is a desirable option for many applications that demand confidence and transparency in transactions due to its decentralized and secure nature.

The financial service sector also known as FinTech, is one of the most promising for using blockchain technology in its many uses. Here are some examples of how blockchain technology can be used in banking industry;

i. Cross-border transactions:

Blockchain technology revolutionizes cross-border payments by eliminating intermediaries, reducing costs, and increasing transaction speed. Through peer-to-peer transactions, blockchain enables real-time processing without the need for multiple banks or middlemen. Its decentralized ledger ensures secure and accurate transactions, minimizing fraud and errors. Additionally, smart contracts automate tasks like identity verification and compliance, streamlining the process and reducing reliance on intermediaries. As blockchain technology continues to advance and gain wider acceptance, it is expected to significantly enhance the

¹¹ <https://rbi.org.in/Scripts/NotificationUser.aspx?Id=11243> (last visited: 29th March, 01:35 pm)



efficiency, speed, and cost-effectiveness of international payments, leading to increased adoption by consumers and businesses.

ii. Digital identity verifications:

Blockchain technology provides a secure and decentralized solution for verifying client identities in the financial services industry. It eliminates the time-consuming nature and vulnerability to fraud associated with existing identification methods. By leveraging blockchain-enabled IDs, banks can enhance customer trust, prevent fraud, and significantly expedite the verification process. Self-sovereign identities (SSIs), also known as blockchain-enabled IDs, provide people control over their identity information and the ability to safely share it with others. Since people own their identity information and are free to grant or withdraw access to it as they see fit, SSIs are constructed on decentralized networks.

For banks and other financial institutions, using blockchain-enabled IDs for identity verification has various advantages, including; Enhanced security: By providing a safe and impenetrable record of consumer identifying information, banks can use blockchain technology to safeguard against fraud and identity theft. Increased efficiency: Blockchain-enabled IDs can hasten the verification process, cutting down on the time needed for manual document processing and hastening customer on boarding. A more fluid and user-friendly on boarding process can be provided by banks employing blockchain-enabled IDs, which would improve the client experience.

iii. Credit reporting:

Blockchain-based credit reporting enhances security and allows for the inclusion of non-traditional variables in credit scoring models. Unlike traditional server-based systems, data is stored across decentralized nodes, making it harder for hackers to access sensitive information. Blockchain technology enables the verification of income and job history through smart contracts and evaluates a borrower's financial responsibility based on their social media activity. This innovation has the potential to revolutionize the credit industry by providing heightened security and more accurate credit scoring. The future development and integration of blockchain technology in the credit reporting process will shape customers' financial experiences.

iv. Trade finance platforms:

Blockchain technology has garnered significant attention in the trade finance sector of the financial services industry. Trade finance involves complex international transactions with multiple parties, including importers, exporters, banks, and intermediaries. By providing a secure and decentralized ledger for recording and validating trade documents such as bills of



lading and letters of credit, blockchain technology enhances the efficiency and transparency of trade finance operations. This can accelerate trade settlement and reduce costs associated with manual document processing. The ability to create smart contracts is a key advantage of blockchain technology in trade finance.

These are only a few applications of blockchain technology in the world of financial services. There will probably be an increase in the number of creative use cases as the technology develops and matures.

CONCLUSION:

Blockchain technology has the potential to fundamentally alter the financial services industry and turn it into an industry-dependent independent variable. Security, transparency, and immutability are three of the technology's fundamental characteristics that have the potential to change existing financial services and open up new avenues for innovation.

Cryptocurrency regulation is rapidly evolving globally. Governments and regulatory bodies are addressing concerns regarding consumer protection, fraud, and money laundering. As cryptocurrency usage grows, regulatory frameworks are being developed to address these concerns while promoting innovation. However, it's important to note that regulations vary between countries and are subject to frequent changes based on government and regulatory responses to industry advancements.

In conclusion, strong laws and rules are essential for the advancement of blockchain technology in the financial services sector. The sector will benefit from growing use, innovation, and investment in blockchain technology if there are standard and unambiguous legislation in place. This could speed the financial services sector's technological extinction.

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