[Review Article] How Blockchain Technology Gives Birth to Digital Currency: A Comprehensive Review

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Abstract

Blockchain technology has revolutionised old financial institutions and changed the way that digital currencies are used today. This paper examines how the invention of digital currency was made possible by blockchain technology, emphasising the underlying ideas and workings of the new phenomenon. This paper offers a comprehensive review of the several ways that blockchain technology has facilitated the invention, advancement, and wide-scale adoption of digital currencies. It looks at the essential characteristics of blockchain technology, such as decentralisation, immutability, and transparency, and discusses how these characteristics help digital currencies succeed and develop. The review also explores how blockchain technology affects conventional financial institutions, as well as the difficulties it presents and the possibilities it holds for a time when digital currencies completely transform the world economy. This review aims to shed light on the revolutionary potential of this technology and its implications for the future of finance through an extensive analysis of blockchain technology's involvement in the creation of digital currencies.

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1. Introduction

Digital currency, in particular, has been transformed by blockchain technology, with Bitcoin serving as its most famous example. It offers a decentralised, decentrralized ledger and resolves security and trust concerns that prevented wider use (Gipp, Meuschke, & Gernandt, 2015). The fundamental ideas behind blockchain facilitate the birth and development of digital currencies, demonstrating its revolutionary potential (Yli-Huumo, et al., 2016; & Yermack, 2015). By doing rid of middlemen and centralised agencies, it makes transactions involving many computers transparent and secure. The underlying technology of Bitcoin, the original digital currency, is blockchain, which Satoshi Nakamoto initially described in 2008 (Swan, 2020). It runs on a public blockchain where transactions are chronologically recorded in blocks, forming an unchangeable chain (Tapscott, & Tapscott, 2016). Decentralisation is an essential aspect of blockchain, where a network of decentralised nodes collaboratively verifies and records transactions to maintain the integrity and security of the system. A majority of the network must agree on every attempt to change a transaction before it can be implemented (Swanson, 2015). Blockchain technology promotes accountability and lowers fraudulent activities by making transactions accessible to participants in real-time (Yli-Huumo, et al., 2016).

It also enables transparency, immutability, and financial inclusiveness. Because of its immutability, which guarantees that transactions cannot be changed or interfered with, digital transactions are highly secure and trusted (Tapscott, & Tapscott, 2016). Blockchain-based digital currencies, especially in developing nations, can empower people and communities with little access to banking services (Ahmed et al., 2022; Ferrari et al., 2020). The invention of smart contracts, which automate and enforce contractual commitments, eliminating the need for middlemen and accelerating procedures, is one example of how this technology has been used in a variety of fields (Yermack, 2015). Overall, the growth of digital currencies and financial inclusion are two areas that blockchain technology has the potential to revolutionise. Blockchain technology does not, however, come without difficulties. According to Pilkington (2016) blockchains can only handle a certain amount of transactions, scalability is still an issue. Another problem is energy use, as maintaining blockchains can demand a lot of computer power (Sharma, et al. 2020). A lot of countries are still figuring out how to effectively regulate the use of blockchain technology, and regulatory frameworks and legal considerations related to it are also still developing.

This study aims to shed light on the revolutionary potential of this technology and its implications for the future of finance through an extensive analysis of blockchain technology's involvement in the creation of digital currencies. The study explores how blockchain technology affects conventional financial institutions, as well as the difficulties it presents and the possibilities it holds for a time when digital currencies completely transform the world economy.

2. Literature Review

This section contains relevant information about related literature on blockchain technologies and digital currencies.

Anatomy of a Blockchain

Blockchain technology as any other physical components it possesses some features that can be called anatomy. Table 1 briefly provides description for each component of the anatomy, while Figure 1 demonstrate the blockchain anatomy. Here is a brief of how blockchain technology works anatomically. Pilkington (2016) blockchain technology is a decentralized system that divides authority, control, and decision-making among multiple nodes, allowing everyone to contribute to maintaining and validating the network (Zheng, Xie, Dai, Chen & Wang, 2017). This decentralization reduces the need for a centralised authority, improving resilience, security, and transparency. Consensus algorithms like Proof of Work (PoW), Proof of Stake (PoS), and Delegated Proof of Stake (DPoS) enable participants to agree on transaction validity and blockchain state (Peters, & Panayi, 2016).

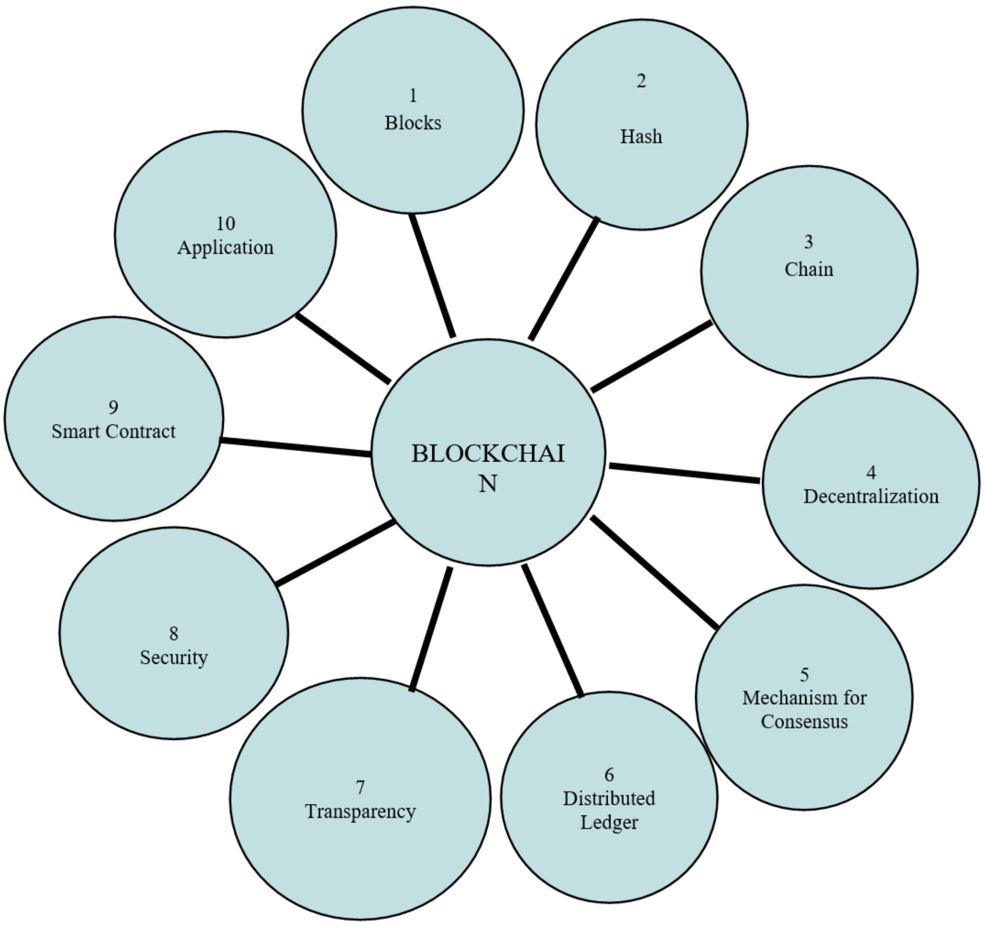

Figure 1. Blockchain Anatomy

Security and trust in Blockchian technology

Security and trust in blockchain technology are crucial for various applications. Key elements of blockchain security and trust include immutability and transparency, distributed ledger, cryptographic security, consensus methods, smart contracts, and transaction audit trail (Tapscott, & Tapscott, 2016). Immutability ensures that once a transaction is recorded on the blockchain, it cannot be changed or tampered with, promoting confidence. Distributed ledgers store numerous copies of the blockchain across many nodes, reducing the possibility of data loss or malicious assaults (Pilkington, 2017).

Cryptographic security ensures the validity and integrity of transactions, making it more challenging for unauthorised changes or forgeries to take place.

Table 1. Blockchain anatomic descriptions

Structure	Descriptions	Sources
Blocks	A blockchain is composed of numerous blocks, each of which contains a group of transactions. A hash, which is generated based on the contents in each block, serves as a unique identification.	(Tapscott, & Tapscott, 2016; Matsumura, 2018).
Hash	A hash is a string of characters with a predetermined length that is produced by a mathematical procedure. It is produced by fusing the data from the block and the hash of the preceding block in the chain to act as an exclusive identifier for each block	(Narayanan, Bonneau, Felten, Miller, & Goldfeder, 2016).
Chain	Blocks are connected in the form of a chain, with each block containing the hash of the one before it. This linkage guarantees the blockchain's immutability and integrity because any change to one block would necessitate updating the hashes of all succeeding blocks	(Narayanan, Bonneau, Felten, Miller, & Goldfeder, 2016).
Decentralisation	Blockchain technology relies on a network of nodes, or independent computers, to function. Together, these nodes validate and record transactions on the blockchain, thereby protecting the system's integrity and security.	(Yli-Huumo, et al., 2016; Tapscott, & Tapscott, 2016).
Mechanism for Consensus	Blockchain networks use consensus techniques to guarantee the precision and agreement of transactions. The most prevalent mechanisms are Proof of Work (PoW), Proof of Stake (PoS), and Delegated Proof of Stake (DPoS), though they vary based on the blockchain. Consensus procedures ensure that all nodes reach consensus on the state of the blockchain by validating and confirming transactions.	(Swanson, 2015)
Distributed Ledger	Blockchain technology makes use of a distributed ledger in which copies of the blockchain are kept on several network nodes. The blockchain is kept robust and resistant to attacks by virtue of this redundancy and spread.	(Peters, & Panayi, 2016)
Transparency	Transparency is a crucial aspect of blockchain technology. Participants can see every transaction made on the blockchain, encouraging responsibility and preventing fraudulent activity. However, strategies like cryptographic keys can be used to guarantee the confidentiality of participants' identities.	(Mougayar, 2016).
Security	Blockchains are made to be tamper-proof and secure. It is very challenging for malevolent actors to alter or manipulate the data on the blockchain due to the decentralised architecture of the network and the cryptographic techniques used to generate hashes and secure transactions.	(s Gipp, Meuschke, & Gernandt, 2015).
Smart Contracts	Smart contracts, which are self-executing agreements with the terms of the contract written in code on the blockchain, are made possible by blockchain technology. Smart contracts reduce the need for middlemen and increase efficiency by automating and enforcing the conditions of the contract.	(Pilkington, 2017; Peters, & Panayi, 2016)
Applications	Although Bitcoin and other cryptocurrencies helped blockchain technology acquire popularity, its potential uses go beyond the financial industry.	(Peters, & Panayi, 2016; Mougayar, 2016).

Consensus and Smart Contract

Consensus methods, such as Proof of Work (PoW) or Proof of Stake (PoS), guarantee that network users agree on the legitimacy of transactions, providing an additional layer of trust and security (Zheng, et al., 2017). Smart contracts automate transactions and lessen the need for middlemen. Public and private key pairs are used in blockchain technology to authenticate and authorize transactions, increasing security (Peters, & Panayi, 2016). Transaction audit trails provide a clear and traceable verification process, improving participant trust and eliminating the need for third-party intermediaries (Swanson, 2015).

Digital currency and its predecessors

Digital currency and its predecessors have existed since the beginning of computing and internet technology. Cryptography, encryption methods, and cryptographic algorithms laid the foundation for secure digital transactions. Electronic money emerged in the 1970s and 1980s, with a central ledger kept by the currency's issuer (Tapscott, & Tapscott, 2016). DigiCash, introduced by David Chaum in the early 1990s, was one of the first attempts to develop a fully anonymous and decentralized digital money. B-Money, introduced by Wei Dai in 1998, was another attempt to create a decentralized and anonymous digital money (Gipp, Meuschke, & Gernandt, 2015). Hashcash, introduced by Adam in 1997, served as a precursor to digital currency by preventing spam emails. Bitcoin, invented in 2009 by Satoshi Nakamoto, decentralized the idea of digital currency through consensus mechanisms like PoW, establishing a peer-to-peer, trustless system for transactions verification (Swan, 2020). Alternative digital currencies, also known as altcoins, have been developed in response to Bitcoin's popularity, including Litecoin, Ethereum, Ripple, and others. Central Bank Digital Currencies (CBDCs) aim to make digital transactions efficient, secure, and accessible (Mougayar, 2016).

Satoshi Nakamoto and the Creation of Bitcoin

Satoshi Nakamoto, an anonymous individual, invented Bitcoin, the first widely used cryptocurrency in history. The whitepaper "Bitcoin: A Peer-to-Peer Electronic Cash System" introduced the idea of a decentralized digital currency, which allowed peer-to-peer transactions without the need for middlemen like banks or governments (Nakamoto, 2008; Swan, 2020). Bitcoin introduced the concept of a distributed ledger technology called blockchain, which records all transactions in an open and unchangeable fashion. Bitcoin revolutionized the financial sector with its decentralized structure and deflationary architecture (Peters, & Panayi, 2016). The lack of concrete evidence surrounding its origins exacerbates the mystery surrounding its origins. Bitcoin's ground-breaking ideas have shaped the worlds of digital currencies and blockchain technology. Bitcoin was introduced in January 2009, allowing for safe, direct transactions without the use of middlemen (Pilkington, 2017). It used blockchain distributed ledger technology, decentralized consensus methods, and cryptography. Miners employed computer power to verify transactions and protect the blockchain, with transaction fees and the creation of new Bitcoins serving as incentives (Nakamoto, 2008).

Bitcoin's ground-breaking technology, particularly its proof-of-work consensus process, sparked innovation in financial and technological fields (Swan, 2020). Since its launch, Bitcoin has grown significantly in value and acceptance, attracting interest from traders, investors, and conventional financial institutions (Sharma, et al. 2020). With a maximum of 21 million coins available, Bitcoin serves as a hedge against established financial institutions. Blockchain, the underlying technology of Bitcoin, is used in voting systems, healthcare, and supply chain management (Pilkington, 2017). The Bitcoin ecosystem, founded by its emergence as the first prosperous digital currency, continues to influence digital finance today.

3. Methodology

This study aims to provide a comprehensive review on how Blockchain technology gives birth to digital currency by exploring the revolutionary aspects of blockchain technology for inventing of digital currency. A total of 31 articles have been used as study samples sourced from various research databases such as Science Direct, Emerald Insight, Research Gate, Google Scholar and Hindawi from 2014 to 2023 (relevant studies on origin and development of digital currencies, see Figure 2). The research design for the study a combination of qualitative and quantitative approaches. The qualitative aspect involves analyzing existing literature, scholarly articles, and reports to gather insights on how Blockchain technology gives birth to digital currency. The quantitative aspect involves collecting data from various sources to analyze statistical patterns and trends related to Blockchain technology and digital currency. To gather qualitative data, several methods can be employed. A systematic review of existing literature, academic papers, and reports from reputable sources helped in gaining a broader understanding of the topic. For collecting quantitative data, various methods can be employed. This includes mining publicly available data from Statista, Cryptocurrency exchanges, Blockchain explorers, and other relevant platforms. This data can include blockchain penetration, market capitalization, price fluctuations, and user behavior patterns.

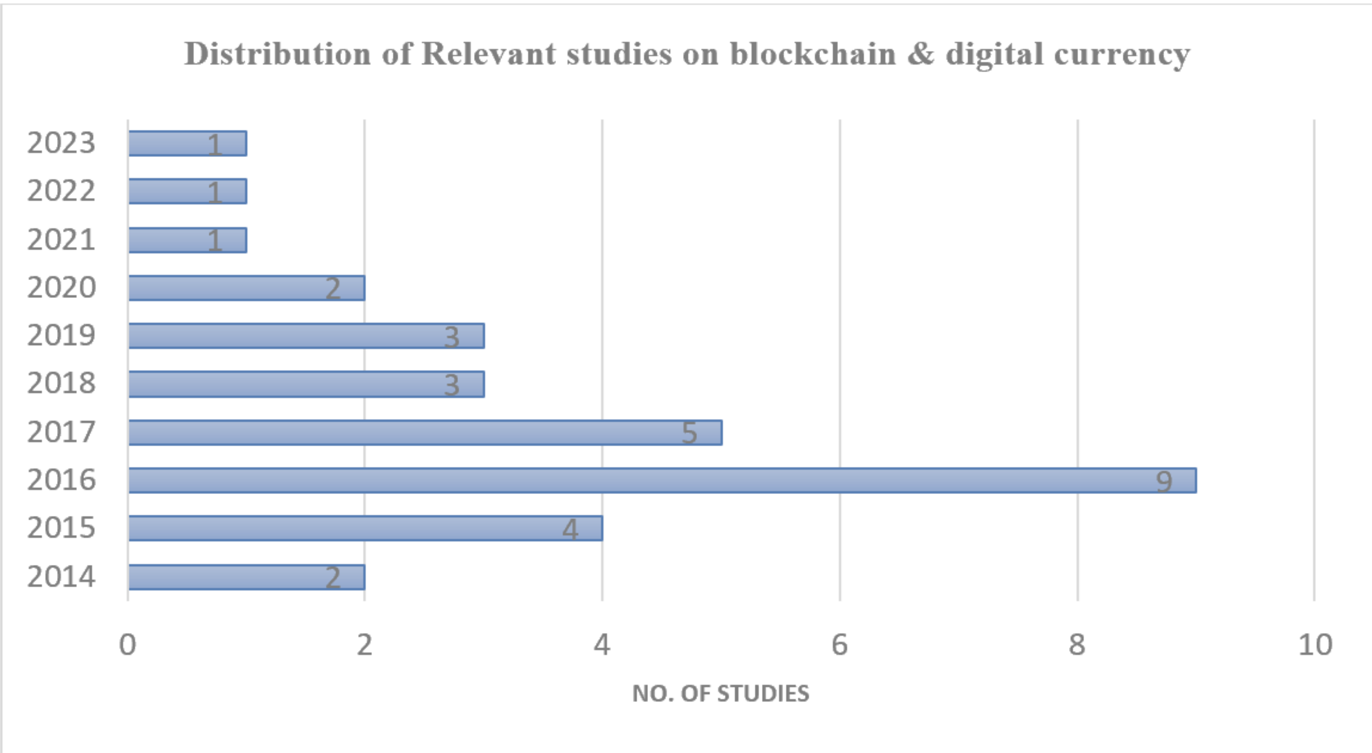

Figure 2. *Distribution of Relevant studies on blockchain & digital currency*

The analysis of data collected for studying Blockchain technology and digital currency. For qualitative data, a thematic analysis approach was used to identify recurring themes, patterns, and key concepts from the literature. This involves categorizing the data to extract meaningful insights and draw conclusions. While for quantitative data, statistical analysis techniques such as descriptive statistics, and data visualization was employed. These techniques help in identifying trends, correlations, and statistical significance within the data. By employing robust research design, data collection methods, and analysis techniques, a comprehensive understanding of cryptocurrency in the twenty-first century can be achieved.

4. Discussion of Findings

How Blockchain Technology Revolutionized Digital Currency

Blockchain technology has revolutionized digital currency by enhancing security, transparency, and decentralisation. Bitcoin, the first cryptocurrency to incorporate blockchain technology, is at the forefront of this transformation (Matsumura, 2018). Blockchain technology creates a decentralized network of nodes where multiple participants verify and log transactions, reducing the risk of manipulation, censorship, and fraud (Tapscott, & Tapscott, 2016). Blockchain technology enhances confidence and security in transactions using digital currency by using a "block" of data to record each transaction, connected to blocks before it in a chain-like manner (Sharma, et al. 2020). Cryptographic hashing techniques make it impossible to change or tamper with the data once a block is included in the chain, making transactions more secure (Nakamoto, 2008).

Transparency and auditability

Transparency and auditability are also enhanced on a blockchain, leading to increased trust and accountability for participants. The distributed structure of blockchain eliminates the need for expensive third-party audits, making it easier to audit and verify transactions (Narayanan, Bonneau, Felten, Miller, & Goldfeder, 2016). Blockchain technology eliminates the need for intermediaries in the exchange of digital currency, lowering costs and increasing efficiency by allowing peer-to-peer transactions (Sharma, et al. 2020. This empowers people and businesses by providing access to financial services for underprivileged communities.

Financial inclusion is another potential benefit of blockchain technology, as it allows people to participate in financial transactions without relying on traditional banking services (Gandal, Hamrick, Moore, & Oberman, 2018). Smart contracts, self-executing contracts with predetermined terms, are a key feature of blockchain technology, removing middlemen or intermediates from the transaction process. This concept can benefit various businesses, including finance, supply chain management, and sports betting.

Elimination of Intermediaries

Blockchain technology and digital currencies offer a significant advantage in the financial sector by eliminating middlemen and enabling peer-to-peer transactions without the need for banks (Nakamoto, 2008). This reduces reliance on centralised authorities, simplifies processes, decreases expenses, and increases efficiency (Peters, & Panayi, 2016). Transaction fees are reduced by blockchain-based cryptocurrencies like Bitcoin, which allow for quicker and more effective transactions without the need for banks (Liao, Wu, & Luo, 2018). Blockchain technology can also be used to replace middlemen in supply chain management, providing real-time and transparent information (Huckle, Bhattacharya, White, & Beloff, 2016). Sports betting is another industry where blockchain and cryptocurrencies are being investigated for cutting out middlemen, offering a safer, more transparent betting experience, and encouraging decentralisation, empowerment, and trust.

Peer-to-peer transactions

Enabling peer-to-peer transactions involves setting up a system or infrastructure that enables people to directly exchange goods, services, or money without the need for middlemen (Nakamoto, 2008). This can be achieved through several steps:

1. Creating new blockchain platforms or using existing ones, such as Ethereum or Bitcoin, which facilitate smart contracts and peer-to-peer exchanges (Swanson, 2015).
2. Building digital wallets that enable users to engage with the blockchain network and safely store their Bitcoin (Peters, & Panayi, 2016).
3. Transaction verification using consensus methods like proof-of-work or proof-of-stake.
4. Building or utilizing decentralized systems that let users list their commodities, services, or assets for immediate peer-to-peer trading (Liao, et al., 2018).
5. Using smart contracts to automate and enforce transaction terms between parties (Huckle, Bhattacharya, White, & Beloff, 2016).
6. Implementing strong security measures to safeguard user information and private keys and prevent fraud (Sharma, et al. 2020).
7. Encouraging user adoption by offering intuitive user interfaces, instructive materials, and financial incentives for engaging in peer-to-peer transactions (Pilkington, 2017).

Blockchain technology benefits from better efficiency, lower costs, improved security, and greater transparency by enabling peer-to-peer transactions. It creates new opportunities for the financial, retail, and other industries (Narayanan, et al., 2016). Transparency and security are key attributes of blockchain technology. Decentralization, immutability, and public ledgers are some of the key features of blockchain technology (Tapscott, & Tapscott, 2016). Decentralization eliminates the need for a central authority, while immutability ensures that transactions cannot be altered or deleted. Consensus mechanisms provide an additional layer of protection against harmful activity. Immutability and auditability are also crucial aspects of blockchain technology. Each transaction is recorded in a block and connected to the one before it in a blockchain, creating a chain of blocks (Peters, & Panayi, 2016). The historical record is kept accurate and undamaged due to the immutability of transactions. Transparency and accountability are critical in various sectors, including finance, supply chains, and healthcare. Additionally, blockchain technology's decentralised and transparent nature allows regulators, auditors, and other interested parties to look over the transaction history and confirm its accuracy. In conclusion, blockchain technology offers a safe, open, and trustworthy mechanism for storing and verifying transaction history, potentially lowering fraud, raising accountability, and boosting trust across various industries.

Empowering Financial Inclusion

As shown in Table 1 blockchain technology and digital currencies offer a significant advantage in the financial sector by eliminating middlemen and enabling peer-to-peer transactions without the need for banks (Nakamoto, 2008). It also revealed how different countries around the globe adopt the use of cryptocurrencies based on the number of population. This reduces reliance on centralised authorities, simplifies processes, reduces expenses, and increases efficiency. Transaction fees are reduced by blockchain-based cryptocurrencies like Bitcoin, allowing for quicker and more effective transactions without the need for banks (Tapscott, & Tapscott, 2016). Blockchain can also replace middlemen in supply chain management, providing real-time and transparent information.

Table 2. Global cryptocurrencies owners in percentages (Source: Global Index (2023)

S/N	Country	Population (in %)	S/N	Country	Population (in %)
1	UAE	27.67	21	Morocco	4.9
2	Vietnam	20.54	22	Colombia	4.81
3	Singapore	13.93	23	Indonesia	4.55
4	Iran	13.46	24	Nepal	4.43
5	US	13.22	25	Germany	4.19
6	Philippines	13.02	26	Canada	4.14
7	Ukraine	10.31	27	China	4.08
8	Venezuela	10.28	28	Ethiopia	4.01
9	South Africa	10	29	South Korea	3.98
10	Thailand	9.32	30	Ecuador	3.71
11	India	7.23	31	Mexico	3.39
12	Brazil	6.98	32	Spain	3
13	Pakistan	6.4	33	Egypt	2.91
14	France	5.9	34	Netherlands	2.7
15	Russia	5.87	35	Australia	2.61
16	Nigeria	5.75	36	Italy	2.43
17	Argentina	5.56	37	Japan	1.74
18	UK	5.52	38	Saudi Arabia	1.6
19	Turkey	5.46	39	Finland	1.36
20	Kenya	4.92	40	Denmark	1.16

Sports betting is another industry where blockchain and cryptocurrencies are being explored for cutting out middlemen (Pilkington, 2017). This technology lowers costs, offers a safer, more transparent betting experience, and encourages decentralization, empowerment, and trust. Overall, blockchain technology can challenge established business structures and build safer, more reliable, and efficient processes. Enabling peer-to-peer transactions involves several steps, including blockchain development, wallet creation, transaction verification, decentralised systems, smart contracts, security measures, and user adoption (Narayanan, et al., 2016). By removing middlemen, blockchain technology improves efficiency, lowers costs, improves security, and increases transparency. This eliminates the need for middlemen and allows people to trade value directly, creating new opportunities in the financial, retail, and other industries. Blockchain technology is known for its security and transparency attributes, which include decentralisation, immutability, and public ledgers (Tapscott, & Tapscott, 2016). Decentralization allows everyone to access the same information, eliminating the need for a central authority. The immutable ledger on blockchain allows transactions to be saved in blocks linked together, preventing changes or deletions. Public ledgers, like Bitcoin and Ethereum, allow anyone to examine and confirm transactions, fostering confidence and fraud prevention (Buterin, & Wood, 2014).

Moreover, it also revealed that there are various security measures which include cryptographic security, consensus mechanisms, immutability, and distributed networks (Sharma, et al. 2020).Cryptographic security ensures data integrity and protects transactions by encryption and connecting each transaction to the previous one. Consensus mechanisms verify and concur on the ledger's current state using consensus algorithms, while immutability makes data manipulation difficult (Nakamoto, 2008; Narayanan, et al., 2016). Distributed networks store a copy of the ledger on each node, making the system resilient to attacks. However, blockchain technology can be vulnerable due to improper implementation, potentially endangering specific smart contracts, user wallets, or the entire system. To ensure proper implementation, it is crucial to consider unique use cases and best practices.

Immutable and auditable transaction history refers to the ability of a system or technology to record transactions without altering or deleting them while making it easy to audit and verify these transactions (Nakamoto, 2008). This concept is often connected to blockchain technology, as each transaction is recorded in a block and connected to the one before it, creating a chain of blocks. The immutability of transactions keeps the historical record accurate and undamaged. Financial inclusion can be facilitated by blockchain technology in several ways. Accessibility and lower costs. Blockchain enables the creation of decentralized digital currencies like Bitcoin or stablecoins, making them accessible to anyone with an internet connection (Ali, Barrdear, Clews, & Southgate, 2014). Peer-to-peer transactions eliminate the need for intermediaries, benefiting people in isolated or marginalized communities who lack access to conventional financial services (Narayanan, et al., 2016). Blockchain technology enhances the process of identity verification, allowing individuals to develop and administer secure, impenetrable, and verifiable self-sovereign identities (Tapscott, & Tapscott, 2016). This enables individuals to have full access to various financial services and participate actively in the financial system.

Challenging Traditional Financial Systems

Blockchain technology has the potential to challenge traditional financial systems in several ways. It can support decentralisation, eliminating the need for middlemen like banks and financial organizations. Transparency and immutable record-keeping are also benefits of blockchain technology, as transactions are recorded on a shared ledger, providing transparency and reducing fraud. Blockchain technology can also reduce costs by automating operations and eliminating the need for middlemen (Sharma, et al. 2020). It can also increase transaction speed, reducing time and friction associated with traditional systems. It can also promote financial inclusion, allowing individuals or populations without access to conventional banking services to create verified digital identities and use peer-to-peer platforms to access financial services (Narayanan, et al., 2016). Smart contracts, self-executing digital contracts that automatically execute specified activities when certain criteria are met, can also be implemented by blockchain technology (Nakamoto, 2008). This can automate complex financial arrangements and reduce costs and boost productivity. However, blockchain technology is still in its early stages, with challenges such as scalability, legal frameworks, compatibility with current systems, privacy issues, and energy usage. Despite these challenges, blockchain technology has the potential to transform conventional financial systems and offer creative solutions that improve effectiveness, transparency, and financial inclusion.

Ethereum and Smart Contracts

Ethereum, a decentralized blockchain platform, has revolutionized the cryptocurrency industry by introducing smart contracts. These self-executing contracts have significantly impacted sectors like supply chain management and finance (Nakamoto, 2008). Introduced in 2015, Ethereum offers a framework for creating decentralized apps and carrying out smart contracts, going beyond simple transactions (Narayanan, et al., 2016). Smart contracts are code that autonomously enforce programmable contracts without middlemen, replacing the need for conventional legal contracts and middlemen (Peters, & Panayi, 2016). It open, immutable, and automation-friendly, establishing confidence and reducing fraud or manipulation (Böhme, Christin, Edelman, & Moore, 2015). They have applications in the financial sector, including decentralised banking platforms, asset tokenization, and supply chain automation. Programmers can build smart contracts using Solidity, a language specifically designed for this function. However, code must be rigorously inspected to prevent flaws or attacks, as seen in the 2016 "DAO hack" (Buterin, & Wood, 2014).

Advent of Initial Coin Offerings (ICOs)

According to Raynor de Best, Statista (2023) Initial Coin Offerings (ICOs) have revolutionized fundraising by offering entrepreneurs and organizations a new method of obtaining funds. ICOs involve a project or business issuing digital tokens in exchange for cryptocurrencies like Bitcoin or Ethereum, representing a stake or utility in the project (Belmonte, & Lago, 2019). These tokens can be traded on various cryptocurrency exchanges and offer global reach, opportunities for investors, and the potential of blockchain technology to ensure transparency and accountability (Hileman, & Rauchs, 2017). However, early ICOs raised concerns about investor protection and fraudulent activity due to lack of regulatory oversight. The reputation of ICOs was damaged by high-profile frauds and failed projects, prompting regulatory organizations to establish rules and frameworks to protect investors and promote ethical ICO practices. New fundraising strategies, such as Security Token Offerings (STOs) and Initial Exchange Offerings (IEOs), have emerged as alternatives to ICOs, aiming to address regulatory concerns and facilitate funding for businesses. It was also revealed that United States has the highest most promising way to improve cross-border payment (Raynor de Best, Statista 2023).

Impact on Global Economies and Regulatory Landscape

Blockchain technology has significantly impacted global economies and regulatory environments by enabling decentralized digital transactions, lowering costs, and promoting financial inclusion (Zheng, et al., 2017). It can reduce cross-border payments, increase transparency, and improve supply chain efficiency. Additionally, blockchain can close the financial divide between those with bank accounts and those without, empowering underserved communities through decentralized applications (Tapscott, & Tapscott, 2016). Regulatory challenges have arisen due to the decentralised nature of blockchain, which makes it challenging for traditional regulatory systems to keep up. Issues such as data privacy, investor protection, anti-money laundering compliance, and digital asset classification are being addressed by governments (Narayanan, et al., 2016).

Regulatory innovation is also being explored by many nations, with some enacting favorable rules to attract blockchain enterprises (Pilkington, 2017). To encourage innovation while managing risks, regulatory sandboxes, pilot programs, and cooperation between regulators and industry participants are more frequent. Central Bank Digital Currencies (CBDCs) are being developed and researched using blockchain technology to improve payment systems, lower transaction fees, and broaden financial inclusion. Smart contracts built on blockchain technology can automate business operations, making global trade and supply chains more efficient, affordable, and transparent (Matsumura, 2018). However, further research is needed on the legal and regulatory implications of smart contracts, and frameworks must be established to ensure legal enforcement and accountability. Overall, blockchain technology is transforming global economies and regulatory environments, with governments and regulatory agencies continuously evolving (Hileman, & Rauchs, 2017).decent

Current Challenges

Blockchain technology is poised to revolutionize industries and economies globally, but it faces several challenges. Scalability can strain the network's capacity, leading to slower transaction speeds and higher costs (Carvalho, Ferreira, & Pereira, 2019). EthTo address these issues, researchers are exploring methods like sharding, layer-2 fixes, and enhanced consensus algorithms. Cross-chain transactions require interoperability, making blockchain standards and protocols essential for these types of transactions. Blockchain's ability to function across borders makes it challenging for governments and regulatory organizations to control cryptocurrencies and initial coin offerings (Matsumura, 2018). The adoption of blockchain technology in the future depends on striking a balance between innovation and investor protection. Proof-of-stake (PoS) and delegated proof-of-stake (DPoS) are being investigated as alternatives to PoW consensus techniques (Mougayar, 2016).

Privacy and security are also crucial in industries like healthcare, finance, and identity management. These issues can be addressed through privacy-preserving technologies like secure multi-party computation and zero-knowledge proofs (Tapscott, & Tapscott, 2016). With increased scalability, interoperability, regulatory clarity, and energy-efficient consensus processes, blockchain technology has a bright future. As blockchain applications develop, it is expected to have wider adoption across various industries, including financial, supply chain management, healthcare, and government (Narayanan, et al., 2016). Regulatory concerns and legal frameworks are also crucial factors in blockchain technology. Due to its decentralization and transparency, blockchain can challenge established legal and regulatory systems (Sharma, et al. 2020). Some of the major concerns include consumer protection, data privacy, jurisdictional issues, smart contracts, tokenization, intellectual property rights, and governance and liability (Cheah, & Fry, 2015).

Blockchain technology integration with traditional financial systems offers several advantages, such as increased efficiency, greater transparency, increased security, cost reduction, and quicker settlements (Matsumura, 2018). However, overcoming regulator concerns, scalability constraints, and interoperability with legacy infrastructures is a challenge (Pilkington, 2017). To ensure compliance with current legislation and respecting privacy obligations, numerous projects and activities are currently underway. These include joint efforts by financial institutions, IT companies, and regulatory agencies, as well as the creation of interoperability standards and legal frameworks tailored to blockchain technology needs (Matsumura, 2018). In conclusion, blockchain technology has the potential to revolutionize the way money is transferred, enhancing efficiency, security, and transparency. However, it is crucial to address regulatory concerns, scalability constraints, and interoperability with legacy infrastructures to ensure its widespread adoption and success.

Emergence of Central Bank Digital Currencies

Central Bank Digital Currencies (CBDCs) are a digital currency issued and governed by a central bank, aiming to act as a digital substitute for physical cash. CBDCs could provide several advantages, including efficiency and cost reduction, financial inclusion, and payment innovation. Blockchain technology is one potential technology for implementing CBDCs, but other strategies like centralized databases and distributed ledger technology (DLT) may also be used. However, there are several challenges associated with CBDC deployment, including ensuring transaction privacy while maintaining security precautions (Mougayar, 2016). A strong regulatory framework is necessary to handle challenges like anti-money laundering (AML), know your customer (KYC), and consumer protection. Interoperability and standardization are also essential for widespread adoption. Central banks must consider how CBDCs will affect monetary policy, financial stability, and the economy.

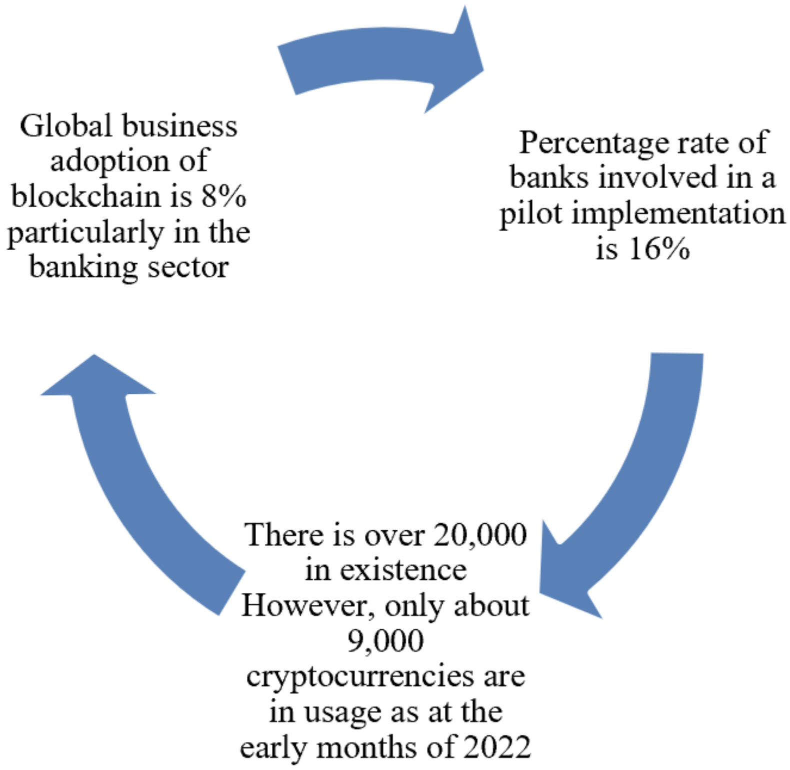

Figure 3. *Facts about CBDC around the globe*

There are different strategies for dealing with CBDCs, with some governments adopting a cautious stance or in the early stages of discussion, while others are aggressively investigating CBDCs, conducting pilot projects, and researching potential use cases. It is crucial to consider the potential benefits and challenges associated with CBDCs when considering their implementation.

Potential Applications beyond Currency

Digital currencies are expected to shape the future of finance by enabling smart contracts and automated financial transactions. They can be coded as money, allowing for decentralised finance, automated payments, and conditional value transfers (Peters, & Panayi, 2016). They can also be applied to supply chain management, enhancing productivity in fields like product authentication and inventory management. Digital currencies can enable new business models like content monetization, pay-per-use services, and micro-donations, enabling low-cost, rapid micropayments (Mougayar, 2016). They can tokenize assets, allowing for fractional ownership, liquidity, and simpler transferability of illiquid assets (Tapscott, & Tapscott, 2016). They can also remove intermediaries, reduce costs, and enhance security, making cross-border payments more efficient. Identity verification technologies can improve privacy and reduce fraud, while voting techniques can build decentralized governance models. Digital currencies can help underprivileged populations achieve financial inclusion, but wider adoption and deployment require overcoming technical, governmental, and scaling obstacles. Drescher (2017) explained that blockchain technology significantly influences the development of digital currencies, offering a decentralized and transparent ledger system for global financial inclusion, efficiency, and security (Fanning, & Centers, 2019).

5. Conclusion

Blockchain technology has revolutionized the way we use money, reducing transaction costs, increasing speed, and eliminating intermediaries. Its immutability and transparency have improved confidence and reduced fraud in financial transactions. To fully harness its potential, cooperation between Fintech businesses, traditional financial institutions, and regulatory agencies is crucial. To ensure seamless integration, scalability and interoperability challenges must be addressed. Public education programs should be initiated to educate people about the benefits and risks of digital currencies, enabling them to make informed decisions. Blockchain technology has the potential to fundamentally change finance, opening up a new era of financial innovation and providing global access to financial control. By addressing its challenges and leveraging its potential, we can create a new era of financial innovation.

6. Recommendations

1. The integration of blockchain technology and digital currencies requires a multifaceted approach. Regulatory clarity is crucial to ensure transparency and consumer protection, while collaboration between Fintech firms, traditional financial institutions, and regulatory agencies is essential for successful integration. Open discussions, collaborative projects, and knowledge exchange can help address issues like scalability, privacy, and interoperability.
2. Education and awareness campaigns are crucial for promoting the wider adoption of digital currencies. These programs should provide information on the advantages, dangers, and actual use of digital currencies, enabling consumers to make informed decisions and businesses to understand the benefits and challenges of using digital currencies as payment.
3. Technological innovation is essential for overcoming current constraints and enhancing scalability, speed, and energy efficiency. Governments and organizations should support the study and development of blockchain technology,

offering grants, funding options, and incubation programs to accelerate technological improvements.

4. International cooperation is also essential for the development of digital currencies. International standards and frameworks can simplify cross-border transactions, simplify regulatory requirements, and promote trust and compatibility among digital currencies. By addressing global cybersecurity and fraud prevention issues, the emergence and development of digital currencies can be facilitated, creating a more inclusive, effective, and safe financial system..

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