

## **SWOT Analysis of Blockchain Funding, Platform Finance, Financial Big Data and Financial Engineering Under the Background of Financial Innovation and Technology**

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### ***Abstract***

*This paper highlighted the Strengths, Weaknesses, Opportunities, and Threats to blockchain technology in financial services. Blockchain is still an evolving and therefore immature technology; it is hard to predict how successful it would be outside its only proven use domain of cryptocurrencies. History teaches us that radically new technologies take many decades to realize their full potential. Thus it is perfectly possible that blockchain would prove revolutionary in the years to come despite its patchy success so far. What is certain is that businesses should be looking at this technology and understanding it because its underlying ideas are powerful and likely to be influential. Policymakers might support the creation of teaching materials on blockchain technology. Users might be able to avoid frequent blockchain frauds, and businesses might find additional capacity to deploy the technology. Policymakers may use blockchain technology to accomplish their own unique goals. This could help organisations in public, and private sectors decide whether the technology can help solve particular issues. Organisations attempting to integrate blockchain technology with their current systems may find this to be more accessible as a result. Based on blockchain technology, policy-makers could explain current laws and regulations or create new ones. This paper presents a comprehensive overview on blockchain technology in the area of Blockchain funding, Platform finance, financial big data, financial engineering financial technology, Financial innovation, Digital economy. blockchain; FinTech; payment services; deposits and lending; financial services; Bitcoin; SWOT Analysis, Ethereum; Hyperledger, smart contract; digital wallet, Quorum, RippleNet and Stellar Network, Algorand Blockchain and Pundi-X. Blockchain technology is a mode of decentralization, which is the next key disrupting technology and worldwide computing paradigm following the mainframe, personal computers and the Internet in addition to social networking/mobile phones. Blockchain is an insurrection encouraging a new world without any middlemen. Theoretically, it is an unchallengeable and tamper-proof distributed ledger of all transactions across a peer-to-peer network. We provide an overview of*

*blockchain architecture.*

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**Keywords:** *Blockchain funding, Platform finance, financial big data, financial engineering financial technology, Financial innovation, Digital economy. blockchain; FinTech; payment services; deposits and lending; financial services; Bitcoin; SWOT Analysis, Ethereum; Hyperledger, smart contract; digital wallet, Quorum, RippleNet and Stellar Network, Algorand Blockchain and Pundi-X*

**Jel Classification:** O33, F15

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## **1.0 Introduction to Blockchain**

With the continuous development of network technology, more and more people have studied the blockchain. Sikorski et al. (2017) explored the application of blockchain technology in relation to the Fourth Industrial Revolution (Industry 4.0); they showed an example of using blockchain to facilitate machine-to-machine (M2M) interaction and established an M2M electricity market in China. Blockchain technology is new computer science and technology with new applications in many fields and has brought changes to society. Blockchain allows the internet to implement a distributed network state, allowing consensus to be shared between connected networks (Zhang et al., 2021). The consensus gives the concept of a network of trust between nodes in a blockchain. Additionally, blockchain is linked to distributed ledger technology.

A blockchain is a chain consisting of one block after another. Each block stores a certain amount of information, and they are connected into a chain according to the time sequence of their generation. chain is kept in all servers, and as long as one server in the entire system can work, the entire block chain is secure. top-level block structure of the blockchain is a structure designed to be tamper proof. Blockchain begins with a node's transaction request, packaged into a block by encryption, decryption algorithms, and sharing mechanisms, and then broadcasts the block to other nodes. Nodes are confirmed and validated in the blockchain network.

When the block is successfully verified, the block will be attached to the end of the blockchain of chain structure; the block cannot be deleted and be tampered. Transaction requests can be stored at the end of the blockchain, and the transaction can be completed (Zarrin et al., 2021).

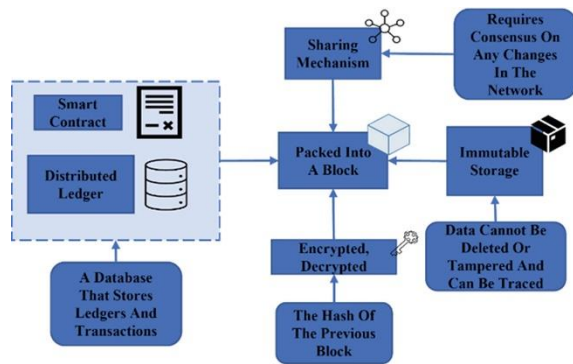


Fig. 1. Blockchain Technology Processing Process

Source: Zarrin et al. (2021)

The essence of Blockchain is a distributed accounting verification database, which can be encrypted by building consensus mechanism (The so-called consensus mechanism is similar to the establishment and governance mechanism in traditional enterprises) to ensure its security, and then through the intelligent contract (that is, the contract executed automatically), the block chain is constructed, so as to effectively solve the trust problem that has always existed in the Internet.

An asset (value) Internet will be formed through the Internet of Information in combination with the trust mechanism, which is different from the current mobile Internet. The current Internet is more like a kind of monetary transaction than a transaction of real assets. Based on Blockchain technology, assets can be linked and traded instantaneously on the Internet. Global assets are far larger than the existing capital market, so the promotion of Blockchain technology will certainly change the existing trading methods and content.

**1.1 Blockchain Architecture:** Starting point of the blockchain is to maintain trust between participants that do not trust each other through the blockchain to establish virtual currency. There are three stages in the development of blockchain. In the blockchain 1.0 virtual currency stage, a large number of virtual currencies represented by Bitcoin entered the capital market. In the stage of blockchain 2.0 intelligent architecture, intelligent architecture appears on the blockchain, and many decentralized applications are applied to the market. A sign of maturity is building a distributed platform. With the continuous deepening of future blockchain technology and applications, blockchain is the trust stage of blockchain 3.0, such as the Internet of big data, cloud computing, and so on. Each blockchain development stage has its architecture changed. For example, in the blockchain 1.0 virtual currency stage, there are basically no concepts such as smart contracts and DAPPs. It also means that general virtual currencies do not have a Turing-complete language. In the blockchain trust stage of blockchain 3.0, the general technical architecture of blockchain has not been fully formed. Technical architecture of the current blockchain is basically in the blockchain 2.0 smart contract period, and specific types of blockchains will also have a partial impact on the technical architecture of the blockchain, which

can be generally represented by Figure 1.

## 1.2 Concept of Financial Technology

Financial technology refers to financial innovations that create new business models, applications, processes, or products through technology. innovations can have a significant impact on financial markets, financial institutions, or financial service delivery methods. Although deregulation and self-regulation can maintain market competitiveness, it is difficult to cope with the actual financial crisis, and international arbitrage has increased due to deregulation. financial technology (or Fintech) is defined as the use of technology and software to improve the processes of financial institutions and to improve the delivery of financial services to end users (Vives, 2017; Ozili, 2018). CBDC Fintech is any technology-enabled innovation in financial services that lead to the development of new business models, applications and processes for the efficient delivery of financial services (Omarova, 2020). Fintech providers often collaborate with financial institutions subject to regulatory approval while few Fintech providers provide independent financial services. New Fintech entrants are often regulated within a regulatory sandbox to promote a level playing field and to enable the development of Fintech innovations under a supportive regulatory environment (Bromberg et al., 2017).

Rapid advancement of financial technology may provide significant benefits to regulators. Blockchain technology, as opposed to the old centralized approach, uses cryptography, distributed consensus, and economic incentives to achieve the benefits of decentralization, non tampering, data traceability, and programmable smart contracts. We can create a blockchain-based evidence retention and collection system based on this characteristic of blockchain technology. Financial supervision not only necessitates a genuine increase in the enthusiasm for nongovernmental financial industry oversight, but also actively improves the independence of financial supervision organizations. Goal of effective supervision is to reduce the expense of supervision while increasing the contribution to social welfare.

**Table 1:** Financial Technologies in Contemporary World

OPEN Application Programming Interfaces (APIs)
Advanced Analytical /Artificial Intelligence/Machine Learning
Conversation Interfaces (Chatbots, Voice Device Interfaces)
Cloud Processing
Mobility and Wearables
Robotic Process Automation (RPA)
Internet of Things (IoT)
Blockchain
Quantum Computing
Augmented and Virtual Reality

Source: Author, 2023

The use of the Internet, the latest mobile applications, and other smart mobile devices reinforced the demand (Puschmann, 2017)) for features and services that the finance sector may offer for

effective electronic transaction processes and provisions in financial information systems. FinTech, the combination of technology and financial services (Trivedi et al., 2021), has become a well-discussed area of study in the new era of the business industry. FinTech companies offer many services, such as digital cash, cognitive systems, and distributed ledger technology. Traditional financial organizations and start-up companies are increasingly partnering with FinTech (Canaday, 2017) to provide user-friendly and cost-effective financial electronic services. Blockchain is a common FinTech that transforms how financial businesses operate, collaborate, and transact with their stakeholders (Creta & Mazaj, 2021). This suggests that the decentralized financial network is bringing about a major financial sector revolution with the enhancement of digital wallets as a crucial component of financial inclusion. The decentralized electronic ledger system will transform the way transactions are carried out, changing the shape and size of the financial sector.

With technology innovations such as big data, cloud accounting, artificial intelligence, and blockchain, it has been fully applied to payment and settlement, loan financing, wealth management, retail banking, insurance, transaction settlement. In the big financial field, the integration of finance and technology is becoming a new trend in the future development of the financial industry. We have all heard the jargon of blockchain and cryptocurrencies like bitcoin. Most of us have a feeling that both are the same. But the fact is that cryptocurrency is an application of blockchain. Bitcoins use blockchain as the core technology for implementation. In the blockchain, everything is decentralized; we can also see it as peer-to-peer connections and transactions stored as blocks.

Bitcoins are cryptocurrencies for making electronic payments without involving banks or real cash by using virtual wallets. These currencies started to be used in 2009. Tracking of bitcoins is transparent, as it is a public ledger and uses blocks to store each transaction. These blocks are connected as a chain with timestamps of transactions. These ledgers are permanent, and no one can alter them. Not all cryptocurrencies use blockchain for their operations, but blockchain is ideal for cryptocurrencies.

Finance and technology evolved together for decades (Arner et al., 2022). Starting in the 1950s, ATMs were introduced to replace human tellers and enabled customer self-service in banking. Credit and EFTPOS cards eventually aimed to eliminate the need to carry cash, while pervasive internet connectivity in the late 1990s led to 24/7 online banking, thus rendering visits to physical branches obsolete for many customers. At the same time, computational risk management, big data analytics or electronic stock trading were introduced to increase the effectiveness and efficiency of service operations.

Actual guidelines, however, on how to conduct theoretically, managerially and societally relevant service research related to Fintech, for example, through systematically identified research priorities, are unavailable to date. In simple terms, blockchain is a distributed digital ledger; each transaction in the ledger is cryptographically signed and grouped as a block. When a new transaction happens, the new block is cryptographically connected to the previous block after proper validation, and it will be replicated to all nodes within the network. Once the new block is appended, we cannot modify the previous block. Blockchain is a digital database that enables simultaneous storage of certain operation records across numerous machines. Digital

data on transactions, contracts, and contact databases are stored using this technology as a series of interconnected blocks. The absence of transparent and unambiguous financial system regulations exposes the business to common mistakes and inaccurate information interpretation. Blockchain technology addresses the majority of these problems and dramatically lowers financial risk.

The global financial system provides services to billions of people daily while managing trillions of cash. Such ambitious objectives come with several difficulties that the finance sector has been coping with for a long time. These issues include the expenditure of having numerous stakeholders, delays, extra paperwork, and data breaches, resulting in enormous losses the business endures each year. The issues facing the global financial system may be resolved by blockchain technology. In addition, the cost of the current stock market is increased by the presence of organisations like regulators, brokers, and the stock exchange. System effectiveness can be increased by using a decentralised management strategy for stock exchanges. There is no need for external regulators because smart contracts can be created on Blockchain. Equity markets are getting ready to decentralise as a result. Blockchain technology makes it possible to conduct every type of investor-company interaction securely and without intermediaries,



Fig. 2. Specific and typical services of blockchain in financial sectors.

Source: Javaid et al. (2022).

### 1.3 Blockchain Technology

Blockchain technology is most simply defined as a decentralized, distributed ledger that Records the provenance of a digital asset. As a distributed accounting verification database,

the idea of transparency, freedom, equality and win-win makes it become a new technology that people follow with interest. The Blockchain is a decentralized data structure with internal consistency maintained through consensus reached by all the users on the current state of the network. It's an enabling technology that resolved the byzantine generals' problem (message communication between untrusted parties) and opened up a new horizon of possibilities for trustless transactions and exchange of information. A specific use of Blockchain like Bitcoin, but rather the fundamental change for the offline world inaugurated by the Web with easy access to information and the possibility of making digital copies of data or content with an unprecedented ease for worldwide distribution.

Blockchain Technology has the most important features, such as decentralisation, perseverance, anonymity and controllability or auditability. Blockchain can operate in a decentralized environment, which is activated by integrating several basic technologies such as cryptographic hashing, digital signature (based on asymmetric cryptographic) and the distributed consensus mechanism. With Blockchain, a transaction can be executed locally. As a result, it can significantly reduce costs and improve efficiency.

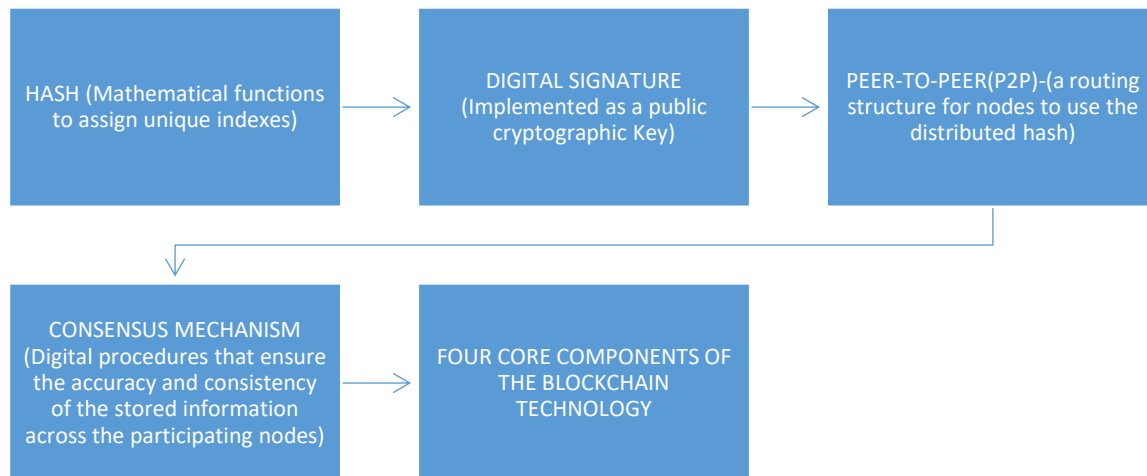


Fig 3: Four Core Components of the Blockchain Technology

Source: Author, 2023

Blockchain has been revolutionized in four stages since 2008 (Fig. 3); the first of which is cryptocurrencies, particularly Bitcoin. The popularity of blockchain has increased because of the introduction of Bitcoin. The second era introduced monetary transactions and smart contracts in mortgages, loans, and other monetary bonds, an automated computer program that executes automatically. In the third era, it has increased in digital society by enhancing the features of smart contracts. The fourth era concerns industrial decentralized ledger systems in different

industries such as government, healthcare, supply management, education, energy, and finance. Blockchain technology has advanced from being a platform for digital currencies to smart contracts to decentralized applications (DApp) with high-speed and expandable decentralized storage and decentralized communication to the infrastructure available for Industry development.

Analogous to how the digital wave disrupted the telecommunication industry, Blockchain Technology is emerging as a FinTech paradigm shift. The author promises to enhance the efficiency of financial transactions and to transform the global financial network altogether. Leaders of the financial industry expect the technology to disrupt the sector. A 2016 survey conducted by McKinsey unveils that approximately 50 percent of the executives in the financial industry are confident that Blockchain Technology will have a significant impact within three years. IBM pronounced that 66 percent of banks will have a scalable Blockchain-based deployment by the year 2020 (Liang, 2016).

Blockchain technology has emerged as a revolutionary and disruptive innovation in both technology and economics in the finance industry and requires a critical level of data integrity. The main objectives are to replace the existing process by eliminating the need for the “trusted third parties.” Undoubtedly, in the finance sector, the global money remittance and automated banking industry will be disrupted by blockchain transformation.

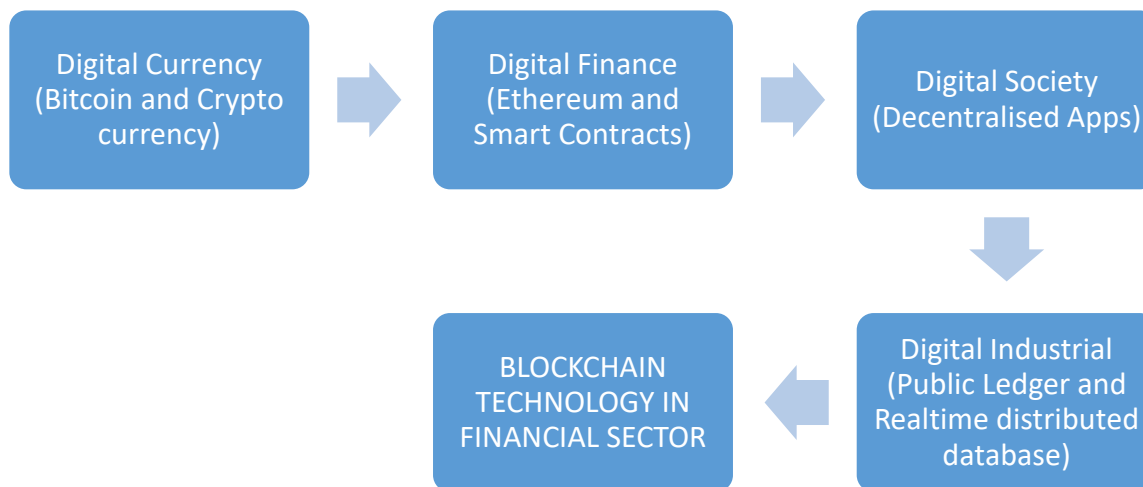


Fig 4: Blockchain evolution in Financial Industry

Source: Author, 2023

### 1.31 Private Blockchain

The private Blockchain is where a central authority manages the rights to access or modify the



database (PwC, 2017). It is valuable for enterprises who want to collaborate and share data, but don't want their sensitive business data visible on a public Blockchain.

### **1.32 Public Blockchain**

In a public Blockchain, all participants are able to access the database, store a copy, and modify it by making available their computing power. Bitcoin, for example, is a public Blockchain (PwC, Blockchain, a catalyst for new approaches in insurance, 2017)

### **1.33 Consortium Blockchain**

“The consortium Blockchain is open to the public but not all data is available to all participants. The main difference between them is that Consortium Blockchain is governed by a group rather than a single entity”.

## **1.4 International Transactions**

Ethereum makes sending money internationally as easy as sending email. It has been developed to conduct international transactions in a secured way. A user can send or receive payments through a wallet. Once the recipient enters the account address from the Ethereum Name Service (ENS) or his/her wallet, the specified amount can be immediately transferred to his/her account.

### **1.41 Smart Contract**

A smart contract is an innovative way to trigger a “contract” program where the deposited cryptocurrency is transferred when a predetermined condition or set of conditions is met. Smart contracts are contractual clauses that have been converted into lines of code that can be run on top of a blockchain. The purpose is to embed the contractual clauses into a blockchain such that they can be enforced automatically. Smart contracts reduce the risk of contract violation, decrease cost and increase trading efficiency. Smart contracts adhere to the immutability of the blockchain, meaning that they cannot be altered once issued. Behaviors that violate the contract, such as financial fraud, can be avoided in some cases. The elimination of a third party allows an automatic settlement of financial transactions, improving businesses' efficiency in addition to reducing turnaround time and removing the need for reconciliation between parties (i.e., cross-border banks) that speed up transactions and the settlement of trades for FinTech companies.

### **1.42 Quorum**

Quorum is a permissioned version of the Ethereum blockchain. It was developed by JP Morgan and was later acquired by ConsenSys. Since it is a permissioned blockchain, nodes must be verified before entering the Quorum network. The consensus algorithms used by Quorum are RAFT and IBFT in place of the PoW implementation of Ethereum 1.0 and Bitcoin. Privacy is preserved in Quorum as transactions are not visible to members of the larger network. This is similar to Hyperledger's channels, where some transactions can only be visible to a smaller group of network nodes maintained on a smaller, private ledger. Quorum is referred to as a free gas network, meaning that there is no “mining fee” for transactions, and there are no cryptocurrency costs associated with its transactions (i.e., Gas is set to zero).

### **1.43 Digital Wallets**

Digital wallets are financial applications that allow users to store public and private keys for their cryptocurrency transactions. Based on internet connectivity, blockchain-based wallets can be categorized into cold and hot wallets. A hot wallet is always connected to the internet and cryptocurrency network. It is used for day-to-day transactions. Cold wallets are called “vaults.” They are not connected to the internet and allow users to store cryptocurrencies with a higher level of security. Cold wallets are less convenient for active traders as they have to move the amount of cryptocurrency to a hot wallet or power on cold wallets and connect them to the internet to carry out transactions.

### **1.5 Blockchain Platforms Adopted in Financial Services**

FinTech companies are shifting towards blockchain-based financial services for security, scalability, and efficiency compared with traditional financial services.

#### **1.51 RippleNet**

RippleNet is a network of financial entities such as banks, payment providers, and other financial institutions. RippleNet routes payments among the financial institutions on their network to settle transactions. The network itself is a decentralized global network that uses a Ripple-developed consensus protocol to validate account balances and transactions within the network. The network keeps track of all the transactions that occur and are publicly recorded and viewable. RippleNet uses Ripple Cryptocurrency, XRP. By having banks and payment providers within the network, Ripple removes the fragmentation within the payments processing landscape. Fragmentation results from the lack of interconnection between multiple securities markets. It can reduce the effectiveness of mass marketing techniques, erode brand loyalty, and result in customer orders being directed to markets that do not necessarily offer the best price (Renduchintala et al., 2022).

Ripple’s solutions have opened up many services for small-to-medium banks and merchants, especially in countries with little financial infrastructure. RippleNet’s integration allows small banks and merchants to complete transactions. Access to the network allows these previously challenged companies to complete cross-border transactions and allow different payment services locally. It also allows Ripple’s financial partners to reach many customers that they would not have been able to reach before due to the lack of infrastructure.

#### **1.52 Stellar Network**

The Stellar Network is a peer-to-peer payments network that originates from the early iterations of the XRP Ledger developed by Ripple. Stellar’s consensus protocol (SCP) utilizes smart contracts to carry out transactions. It uses the Quorum blockchain to emphasize security and speed up transactions within the network by utilizing the slices. A Quorum slice is a subset of nodes on the network that a given node chooses to trust and depend on.

Stellar allows each node to choose what node is within its “trusted zone” (slice), enabling open participation and more jurisdiction over who is validating the transactions, leveraging the trust built through interpersonal interactions. Interpersonal interaction is the communication that

occurs between interdependent nodes that have some knowledge of each other. However, to reach a global consensus, there have to be intersections between Quorums—meaning that one node in the Quorum slice must also be in another Quorum slice to maintain the integrity of the network. This

allows the network to reach a consensus without relying on a centralized/closed system.

### **1.53 Algorand Blockchain**

The Algorand blockchain is a payment solution with its point-of-sale implementation. Their application acts as a point of sale and communicates with a crypto wallet containing its currency (‘Algo’) through a transaction gateway. The Algorand process starts with an application that captures the transaction details and creates an unsigned transaction that is then sent to the transaction gateway. The transaction gateway forwards it to the wallet. The signing wallet receives the unsigned transaction and waits for approval from the consumer. The transaction gets signed and returned to the gateway if the consumer approves it.

The entire receipt is stored in an off-chain storage system—essentially recording the transaction in an immutable manner so it can be retrieved when needed. The storage system eliminates the need for data to be managed by the point of sale system/application as it is stored on an off-chain system. That way, all the data can be managed and retrieved at any time. The Algorand blockchain uses a pure PoS consensus algorithm that requires minimal computation.

### **1.54 Pundi-X**

Pundi-X is an end-to-end platform that allows consumers to use cryptocurrency at retail points of sale. Consumers must have a mobile wallet to use the platform. The mobile wallet maintains the public key encryption behind a standard password-based system to be user-friendly.

The platform also allows for “physical” smart card information to be loaded by the mobile app and allows the currency to be used even without access to a smartphone. Although Visa and Mastercard have networks that enable using cryptocurrency as payment through conversion to a fiat currency, the issue is that not all locations worldwide have access to these services. Pundi-X targets under-serviced countries where it allows merchants and users to begin to transact more digitally. Pundi-X is currently marketing in Indonesia, giving a hardware device to merchants in retail environments when a smartphone is available. Merchants can carry out their transactions on a smartphone-based application as well.

## **1.6 International Money Transfer (Remittance)**

Blockchain has revolutionized cross-border payments. Several companies (such as Ripple, Everex, SureRemit, etc.) have capitalized on using blockchain for remittance. This subsection discusses the current issues faced by the remittance international money transfer segment and reviews how Everex and SureRemit solve these issues. Currently, the remittance market is dominated by the Society of Worldwide Interbank Financial Telecommunication (SWIFT).

SWIFT is a network of banks that connects all corners of the world. For a transaction to be completed, the transaction must go through a clearing or settlement center before the transaction is cleared. SWIFT itself does not settle the transaction. It simply confirms the consumer’s

transaction request. It is up to the banks to settle the transaction and relay the confirmation back to SWIFT so both sides can acknowledge the transaction's completion. For a cross-border transaction to be executed, it has to pass through several banks because not all banks operate with a large variety of fiat currencies in other countries. Thus, a route between banks must be established to allow currencies to be exchanged into the desired receiving currency (Renduchintala et al., 2022).

### **1.7 Deposits and Lending**

Deposits and Lending is a segment of the FinTech industry that relies on companies enabling people to obtain loans and monitor and collect information about their credit. This section focuses primarily on the Lending aspect of this segment as it has the largest application within the blockchain and provides an overview of Colendi, Figure, and Celsius Fintech companies.

Blockchain can speed up verification processes by simplifying and breaking down barriers to obtaining a loan and even allowing other people to lend money without the risk of not knowing who they are lending to. Businesses and consumers can use blockchain-aided platforms to initiate transactions and loans guaranteed through the ledger's transparency and immutability.

### **1.8 Bitcoin**

Bitcoin introduced the concept of blockchain to the world. It was created by Satoshi Nakamoto. It has been popular since its introduction and has enlightened many derivatives worldwide. It is a permissionless public ledger record, meaning that the ledger of all Bitcoin transactions is accessible publicly and distributed to nodes worldwide. Since its creation in 2008, many have argued that Bitcoin should be seen as a speculative commodity rather than just a cryptocurrency (Renduchintala et al., 2022).

The symbols used for bitcoin are BTC or XBT. BTC is short for Bitcoin. These abbreviations come from the International Standards Organization (ISO), which maintains a list of internationally recognized currencies. The "X" indicates that the currency is not associated with a particular country. Many FinTech applications are built on the Bitcoin distributed ledger, where the transaction records can be easily verified.

### **1.9 Ethereum**

Ethereum was created as an alternative protocol to Bitcoin and allows for building decentralized applications, writing smart contracts, and managing digital assets. Ethereum is a permissionless, open-source blockchain platform. Its smart contract implementation and development kits are the most popular blockchain platform for decentralized applications (Renduchintala, et al., 2022).

Ethereum has a native digital currency called Ether (ETH) that has three primary purposes: to settle transactions through the exchange of ETH and enable network operations by using ETH as currency to pay transaction fees and store value. Ethereum has the largest enterprise ecosystem in the world, with an active technical community of over 300,000 developers and infrastructure experts coordinated by the Enterprise Ethereum Alliance (EEA), which is dedicated to promoting Ethereum adoption and comprises the world's largest companies such as Microsoft,

JP Morgan, Accenture, ING, Intel, and Cisco.

### **1.10 Fund Aggregation**

A regular investor needs an orderly platform to manage all of his transactions, loans, and investments. On Ethereum, there are a variety of solutions that can manage all DeFi activities. Developers can create user interfaces that allow investors to use all the services offered by DeFi's open architecture.

### **1.11 Digital Money**

A standard feature of the token is that it can make it possible to combine financial institution services with the security and governance of Bitcoin. As a result, Ethereum can permit a variety of operations that are not possible with Bitcoin, such as investing in index funds, borrowing and lending money, scheduling payments, and more.

### **1.14 Faster Payments**

Blockchain can offer instant payments at minimal bank fees, thanks to the functionality of the decentralized ledger. Blockchain is faster and more secure than any traditional mode of completing transactions. By doing so, the bank will be able to eliminate middlemen, thereby creating a situation for both the customers and the bank to perform more transactions in a given time-frame. By creating a decentralized payment channel, banking institutions can compete with cutting-edge fintech firms, introduce innovative products, and raise their service standards, while simplifying and reducing the cost of administrative processes.

### **1.15 Withdrawal and Settlement**

Before a direct bank transfer reaches its intended recipient, it passes through a complex network of intermediaries, including custodial services. Additionally, bank balances are verified by the entire global financial system, which includes a vast network of traders, asset managers and other financial professionals.

Consider a scenario in which a customer wants to transfer money from a bank account in the US to an account in India. This transfer is possible only through the Society for World-wide Interbank Financial Telecommunications (SWIFT). Every day, SWIFT employees make about a quarter of a billion communications to some 10,000 odd companies. Only payment orders are handled by the central SWIFT protocol. The actual money is exchanged through a network of intermediaries, and each of them is compensated on a proportionate basis. This leads to huge expenses on the customer and undue delay in the processes.

### **1.16 Portfolio Management**

On Ethereum, there are a variety of fund management products aimed at expanding the portfolio according to the client's own plan. These products are accessible to all, and operate automatically using innovative technology. There is no opportunity for the human manager to make a dent in the customer's earnings. At the same time, the investor is never required to operate a separate portfolio as he can withdraw money from the fund at

any time.

### **1.17 Quadratic Funding**

For quadratic funding, Ethereum has established a state-of-the-art model of fundraising. According to the laws of quadratic financing, the initiatives that most benefit the lives of the most people are those that have the most concentrated demand. This could increase the distribution of wealth for a variety of public goods in the future.

A quadrature fund is a collection of gifts from which to create a round of public funding. Interested people can increase the demand for a particular project by making financial contributions. When the round is complete, funds from the matching pool are divided among projects with the most specific needs taking the lion's share.

## **2.0 SWOT Analysis of Blockchain Finance and Technology**

### **2.1 Strengths**

Blockchain has shown its potential in industry and academia. We discuss possible future directions with respect to four areas: blockchain testing, stop the tendency to centralization, big data analytics and blockchain application. Blockchain can provide hedge fund investors and strategists with more participation options. Hedge funds minimize risk while maximizing returns for investors. In this wake, impact investment is also soon going to leverage blockchain technology. Impact tokens can be rewarded for specific actions and linked to smart contracts.

As the blockchain uses only an appending ledger format, therefore easily tracks the entire transactions, and cannot be modified like traditional databases. Blocks in the blockchain are cryptographically secured; this ensures that the blockchain data cannot be tampered with. Since the ledger is shared with all nodes within the network, it ensures transparency, and it avoids a single point of failure. Blockchain technology works without intermediaries; therefore, the transaction happens fast without charge or with a very nominal charge.

#### **2.11 Digital Identities**

Financial institutions, in order to comply with 'know-your-customer' obligations and 'beneficial ownership' requirements, verify numerous data points about every potential corporate and individual customer. To reduce the massive duplication inherent in existing KYC checks, banks and other traditional service providers are looking to become 'KYC bureaus', with DLT potentially standing in as the cross-institution source of proof. According to the World Bank, more than 1.1 billion people around the world still cannot claim their identity. At the same time, companies and financial institutions in both tradition and digital market need to follow strong Customer Knowledge Initiative (KYC).

#### **2.12 Smart contracts**

In addition to keeping a ledger of ongoing currency transfers, Blockchain can also reliably record other types of time-sequenced data, including processing the steps required to execute programs known as 'smart contracts'. Smart contracts digitally facilitate and enforce the

transfer of digital assets according to software defined contract conditions (Michael Casey, 2018). The example of the insurance industry is full of costly mistakes and mistakes. In USA, the FBI estimates that more than \$ 40 billion per year is lost as a result of fraud across all non-health insurance industries.

### **2.13 Distributed ledger Technology (DLT)**

The term DLT also enters the discussion whenever we discuss blockchain. We consider blockchain also as a peer-to-peer distributed architecture. DLT is old technology, and blockchain uses its concepts in implementation. Blockchain is not DLT alone but has many more features. DLTs and cryptocurrency were first suggested for the financial sector, including banks. Conversely, it was quickly discovered that DLTs are not restricted to trading in virtual currencies or goods but could be used to swap digital assets. The idea is that DLT encourages network users to pass and update information or documents, and that this is done in a trusted environment.

### **2.14 Blockchain testing**

Recently different kinds of blockchains appear and over 700 cryptocurrencies are listed in the world up to now. However, some developers might falsify their blockchain performance to attract investors driven by the huge profit. Besides that, when users want to combine blockchain into business, they have to know which blockchain fits their requirements. So blockchain testing mechanism needs to be in place to test different blockchains.

Blockchain testing could be separated into two phases: standardization phase and testing phase. In standardization phase, all criteria have to be made and agreed. When a blockchain is born, it could be tested with the agreed criteria to valid if the blockchain works fine as developers claim. As for testing phase, blockchain testing needs to be performed with different criteria. For example, an user who is in charge of online retail business cares about the throughput of the blockchain, so the examination needs to test the average time from a user send a transaction to the transaction is packed into the blockchain, capacity for a blockchain block and etc.

### **2.15 Stop the tendency to centralization**

Blockchain is designed as a decentralized system. However, there is a trend that miners are centralized in the mining pool. Up to now, the top 5 mining pools together owns larger than 51% of the total hash power in the Bitcoin network. Apart from that, selfish mining strategy [10] showed that pools with over 25% of total computing power could get more revenue than fair share. Rational miners would be attracted into the selfish pool and finally the pool could easily exceed 51% of the total power. As the blockchain is not intended to serve a few organizations, some methods should be proposed to solve this problem.

### **2.16 Big data analytics**

Blockchain could be well combined with big data. Here we roughly categorized the combination into two types: data management and data analytics. As for data management, blockchain could be used to store important data as it is distributed and secure. Blockchain could also ensure the data is original. For example, if blockchain is used to store patients health information, the information could not be tampered and it is hard to stole those private information. When it

comes to data analytics, transactions on blockchain could be used for big data analytics. For example, user trading patterns might be extracted. Users can predict their potential partners' trading behaviours with the analysis.

### **2.17 Accountability**

The main advantage of blockchain is that it can track and verify trades, allowing people and businesses to transact without the help of a third party or centralized entity. Blockchain can make bank transactions more robust by authenticating each transaction. By providing equal rights to all participants in the transaction chain, blockchain establishes a shared infrastructure rather than placing everything under the jurisdiction of a central authority. Users can be assured that the transactions will be done in compliance with the protocols and there is no possibility of counterparty risk. Banks can provide auditors and government officials with access to their procedures via a blockchain ledger, enabling banks and auditors to avert suspicious transaction activity and speed up the auditing process.

### **2.18 Enhanced Security**

Banks can use distributed ledgers to carry out quick and secure transactions. A combination of distinct digital signatures, including a public key and a private key that are subject to strict cryptographic controls, can be used to protect each transaction. Every user has access to a public key, while parties to a specific transaction share a private key. Data cannot be modified after it has been entered in a block. Thus, blockchain is inherently safe as it is shared by a lot of people, making hacking impossible. Blockchain lowers the risk of fraud by utilizing transactional value exchanges that rely on both public and private decryption codes.

## **2.2 Weaknesses**

**Privacy Leakage:** Blockchain can preserve a certain amount of privacy through the public key and private key. Users transact with their private key and public key without any real identity exposure. Blockchain cannot guarantee the transactional privacy since the values of all transactions and balances for each public key are publicly visible.

## **2.3 Opportunities**

Blockchain-based systems enable the faster, more cost-effective, and more customised issuance of digital securities. With its adoption, the market for investors can be expanded, costs for issuers can be reduced, and counterparty risk can be reduced due to the ability to customise digital financial instruments to the demands of investors. It uses mutualised standards, protocols, and shared procedures to give network users a single common source of truth. Participants in the business network can now more easily collaborate, manage data, and agree with this technology's application.

Blockchain can facilitate the direct settlement of financial transactions and better retention of their history than existing methods such as SWIFT. Because bank transfers follow processes embedded in our financial system, they often take a few days to settle, whereas distributed ledger technology can enable real-time transactions between financial institutions, and thus speed-up the withdrawal and settlement processes.



### **2.31 Loans and Credits**

Banks typically rely on credit reporting systems to evaluate loan applications. However, using a blockchain network with peer-to-peer lending capabilities can streamline the lending process and increase security for syndicated loans or mortgages. Traditional risk assessment methods, such as credit scores and debt-to-income ratios provided by credit agencies, can be vulnerable to harm for both banks and consumers. Blockchain technology offers a more secure, efficient, and cost-effective alternative for handling loan applications.

### **2.32 Transfer of Assets**

Capital markets can be made more efficient by blockchain. Placing securities such as stocks, bonds and alternative assets on a public blockchain can reduce the volatility of the current securities market. Often assets such as stocks, commodities or debt are bought and sold based on what the seller has and what the buyer needs. In doing this a complex network of brokers, exchanges, clearing houses, custodian banks and central security depositories help financial markets.

### **2.33 Identity Authentication**

Identity verification is a prerequisite for every online financial transaction. However, customers do not appreciate certain steps in the verification process, such as face-to-face or Know Your Customer (KYC) verification by being physically present before a financial organization, password-based authentication for online services, etc. Since it is a precondition for every new service provider to complete all these tasks for security reasons, consumers and businesses can benefit from accelerated verification processes with blockchain.

### **2.34 Peer-to-Peer Transfer**

Customers can use peer-to-peer (P2P) transfers to send money online from their bank accounts or credit cards. Although there are many P2P transfer software in the market, there are some restrictions associated with each one. Some apps allow financial transactions within a specific geographic region only, while there are others that do not allow money transfers if both parties are in the same country. With blockchain enabled decentralized apps, P2P transfers can be facilitated anywhere and anytime. Blockchain allows global P2P transfers as there are no geographic precincts. Transactions can be instant and incur no fees.

Blockchain applications use two types of security keys: private and public keys. All network users have access to the public key, but only the participants in a transaction can access the private key. As a result, users inside a network can see the transaction, while participants can only access the transaction's specifics. Blockchain can preserve financial system transparency while safeguarding the private financial data of transaction stakeholders. Nearly every industry in the world could experience a fundamental shift in how business is conducted due to blockchain technology. As the technology and its use cases develop and advance, Blockchain enables businesses to create better transparency, traceability, and operational efficiency for various business transactions and contracts. Financial institutions are looking at ways to use Blockchain to its full potential, including identifying product opportunities, resolving regulatory

issues, and overcoming challenges in recognising/assessing risks and corresponding controls.

## 2.4 Threats

There are difficulties in putting blockchain technology into practice. Despite various challenges, it can be used by hundreds of financial institutions, and blockchain stocks are accepted forms of investment. It is evident that the financial sector is aware of the potential advantages of Blockchain and that it will play a more significant role in financial services in the future. Blockchain technology uses a decentralized ledger and is a form of distributed ledger technology that is secured with public and private security keys. The public key is available to all network users, and the transaction's stakeholders access the private key. As a result, the stakeholders and transaction details will only be visible to those who possess the private key, while the transaction will be visible to all network users with the help of the public key. It will guarantee system transparency while safeguarding the private financial data of the stakeholders.

Violation of privacy cannot be ruled-out on blockchain: The holder of the cryptocurrency can be tracked using the public key associated with his or her payment. A behavior map can be accessed and constructed using software tools based on the data collected through public keys, your buying habits, spending power and transaction volume.

Privacy (absence of identity) can fuel the growth of illegal activities such as drug trafficking, financial terrorism, and money laundering. In wake of cyber-attacks, investors may be at risk of significant financial loss if they lose their cryptographic keys because, in most situations, the attack is immediate and irreversible. According to Irwin and Turner (2018), procedures ought to be regulated to prevent fraud and money laundering.

Switching to blockchain technology can be expensive and time-consuming, especially given the scarcity of qualified blockchain developers. Smaller financial companies, in particular, could be reluctant to invest in modernising their current systems. Data on a blockchain cannot be altered. Although this is a benefit of employing Blockchain, financial companies that regularly need to change stored data may find it problematic. To implement Blockchain, companies would need to alter their current procedures. Both the development of blockchain technology and its use in the financial services sector are still in their infancy. The two most crucial blockchain innovations to keep an eye out for are our transaction processing and interoperability advancements, as both will increase the technology's utility for financial institutions. It is doubtful that blockchains will replace current financial systems in the foreseeable future. Instead, financial institutions will test out Blockchain to gauge its potential before implementing it gradually as an addition to their current systems.

The development of Blockchain is still in its early phases. It has several difficulties due to continuing changes. On the Blockchain, data updates are not authorised. Information from other blockchains cannot be exchanged or used by one Blockchain. They are unable to converse with one another as a result. Interoperability solutions must be prioritised in blockchain networks. It is expensive and time-consuming to make the switch to blockchain technology. This is true because there are not many skilled blockchain engineers. Smaller financial institutions can therefore be

reluctant to make investments in addition to current system changes. These include the potential for technology to be used to facilitate illicit behaviour, hazards to users, and the financial system brought on by the current dearth of consumer protections. Blockchain may not adequately handle most of the significant issues related to each application. and utilise a car while finding solutions to issues like electromobility.

### **3.0 Development and Supervision of Financial Technology Based on Blockchain**

Decentralization, stability, security, and immutability are all features of blockchain technology. Blockchain, as the underlying technology of Bitcoin's digital monetary system, is currently sweeping the globe. Blockchain is a revolutionary decentralized database technology that employs encryption, a timestamp chain data structure, a distributed consensus mechanism, and other technologies to achieve decentralization, tamper resistance, easy tracking, and programmable smart contracts. In the face of rising financial technology, we must maintain inclusive, technological, and invasive regulatory principles that not only foster financial innovation, but also conduct dynamic supervision to avoid systemic financial hazards.

### **4.0 Conclusion and Recommendation**

This paper highlighted the Strengths, Weaknesses, Opportunities, and Threats to blockchain technology in financial services. Blockchain is still an evolving and therefore immature technology; it is hard to predict how successful it would be outside its only proven use domain of cryptocurrencies. History teaches us that radically new technologies take many decades to realize their full potential. Thus it is perfectly possible that blockchain would prove revolutionary in the years to come despite its patchy success so far. What is certain is that businesses should be looking at this technology and understanding it because its underlying ideas are powerful and likely to be influential.

Policymakers might support the creation of teaching materials on blockchain technology. Users might be able to avoid frequent blockchain frauds, and businesses might find additional capacity to deploy the technology. Policymakers may use blockchain technology to accomplish their own unique goals. This could help organisations in public, and private sectors decide whether the technology can help solve particular issues. Organisations attempting to integrate blockchain technology with their current systems may find this to be more accessible as a result. Based on blockchain technology, policy-makers could explain current laws and regulations or create new ones. This paper presents a comprehensive overview on blockchain technology in the area of Blockchain funding, Platform finance, financial big data, financial engineering financial technology, Financial innovation, Digital economy. blockchain; FinTech; payment services; deposits and lending; financial services; bitcoin; SWOT Analysis, Ethereum; Hyperledger, smart contract; digital wallet, Quorum, RippleNet and Stellar Network, Algorand Blockchain Pundi-X. Blockchain technology is a mode of decentralization, which is the next key disrupting technology and worldwide computing paradigm following the mainframe, personal computers and the Internet in addition to social networking/mobile phones. Blockchain is an insurrection encouraging a new world without any middlemen. Theoretically, it is an unchallengeable and

tamper-proof distributed ledger of all transactions across a peer-to-peer network. We provide an overview of blockchain architecture

Blockchain technology plays a vital role in the financial sector as it ultimately lifts trust and the need for third-party verification by using consensus-based verification. This survey provides a comprehensive summary of the most relevant blockchain-based FinTech implementations and an overview of FinTech sectors and segments. Financial service providers find blockchain technology useful to enhance authenticity, security, and risk management. Several institutions are adopting blockchain in trade and finance systems to build smart contracts between participants, improve efficiency and transparency, and open up newer revenue opportunities.

Blockchain's unique recording capabilities make the existing clearing and settlement process redundant. Banks and other financial entities are adopting blockchain-enabled IDs to identify people. Better results come from organisations' capacity to foresee emerging trends in financial blockchain applications and develop blockchain functionality. The transfer of asset ownership and addressing the maintenance of a precise financial ledger. Measurement, communication, and analysis of financial information are three significant areas to be focused on by accounting professionals. Blockchain clarifies asset ownership and the existence of obligations for accountants, and it has the potential to improve productivity. This paper identifies and studies relevant articles related to blockchain for finance. This paper focuses on Blockchain technology and its importance for financial services. Further takes up various tools, strategies, and featured services in Blockchain-based financial services (Krylov & Seleznev, 2019).

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